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Final Environmental Impact Statement for Southwest Orange County, Florida Wastewater Management

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This Final EIS addresses proposed wastewater facilities for Southwest Orange County, Florida. Numerous wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the sensitive natural and human resources of the area. The selected alternative is wastewater reuse with spray irrigation in citrus groves and rapid infiltration basins.

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Region 4
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Atlanta, GA 30365

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Environmental Impact Statement

Final

Southwest Orange County, Florida Wastewater Management

REPRODUCED BY
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FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
SOUTHWEST ORANGE COUNTY, FLORIDA

Prepared by
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia 30365

This Final EIS addresses proposed wastewater facilities for Southwest Orange County, Florida. Numerous wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the sensitive natural and human resources of the area.

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April 25, 1985
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EXECUTIVE SUMMARY

PART A - NEED FOR ACTION

The Environmental Impact Statement (EIS) for the Southwest Orange County 201 Wastewater Facilities Planning Area addresses alternate wastewater management facilities and the potential impacts of these facilities on the environmental resources of the area. The study area for the EIS includes the southwestern quarter of Orange County with the exclusion of the Reedy Creek Improvement District (RCID) as shown in Map I-1. Southwest Orange County is one of the most rapidly developing areas in the U.S. Growth in the area has been spurred by the development of the tourist and manufacturing industries. The Orlando area is the number one tourist destination in the world. Major tourist attractions and large hotels are located in the southwestern portion of the Planning Area.

Centralized wastewater collection systems within the 201 Planning Area are owned and operated by Orange County, the City of Orlando and the City of Winter Park. Orange County and the City of Orlando own and operate the two centralized wastewater treatment facilities located in the 201 Planning Area. Discharge of treated wastewater effluent from these facilities is to Shingle Creek. Twenty-five package plants with design flows equal to or less than 0.75 mgd and utilizing on site land disposal also exist. On-lot septic tank systems provide service to most of the rural and urban fringe areas.

The EPA has determined that nutrient loadings from the Orange County Sand Lake Road and City of Orlando McLeod Road treatment plants are transported by Shingle Creek to Lake Tohopekaliga in Osceola County and have contributed to the eutrophication of the lake. The value of Lake Tohopekaliga as a recreational sportfishery is being jeopardized as a result of deteriorating water quality. In accordance with recommendations of various federal, state and regional water quality studies, NPDES Permits issued by the U.S.E.P.A. for both facilities state that in the future no discharge to surface waters will be permitted. Both plants have been operating for several years under temporary operating permits from the Florida Department of Environmental Regulation (FDER) until plans to eliminate the discharges can be completed and implemented.

It was concluded from the drilling and evaluation of potential discharge zones of a deep (6,192 feet) test well by Orange County in 1977 that deep well injection was not a viable option in Southwest Orange County. Subsequently, Orange County agreed to act as lead applicant for a grant from EPA to prepare a 201 Facilities Plan for the Southwest Orange County 201 Planning Area. In May 1978 Orange County and EPA signed a Memorandum of Understanding which provided that a "piggy-back" Environmental Impact Statement would be prepared "in connection with the planning, design and construction of treatment works in Orange County...". In the Notice of Intent, EPA stated that the major issues which were to be addressed in the EIS include the means of effluent disposal, effects on area water resources and economic impacts of secondary growth.

PART B - DESCRIPTION OF THE ALTERNATIVES

Feasible alternatives were developed in the 201 Plan to provide for wastewater collection, treatment and disposal. Centralized systems were considered only in the area designated for the provision of urban services in the approved Growth Management Plans (GMPs). The majority of land in the 201 Planning Area is designated as Rural Service Area. Publicly owned wastewater or water supply systems are, by policy, not to be provided in the Rural Service Area. Projected Year 2000 wastewater flows of about 43 million gallons per day were estimated for the Urban Service Area portion of the Planning Area based on population projections developed for the Orange County and City of Orlando GMPs.

Growth management policies encourage low density residential land uses in the Rural Service Area, and high density residential, industrial and commercial land uses in the Urban Service Area to reduce the cost of providing public services. Therefore, the 201 Plan addresses centralized wastewater management only in the Urban Service Area portion of the Planning Area. Although various service area and interceptor alternatives were considered, the potential area to be served by publicly owned systems remained constant. The potential use and cost-effectiveness of septic tanks in the Urban Service Area was also evaluated in the 201 Plan. Septic tanks or other private on-site systems are to be used in the Rural Service Area. The remainder of this section presents a description of each of the final set of wastewater treatment and disposal alternatives for the service area and interceptor alternative considered to be most cost-effective.

Discharge to Shingle Creek

This alternative involves the continued discharge of wastewater effluent from the Orange County Sand Lake Road and City of Orlando McLeod Road treatment facilities at their existing discharge locations. Inclusion of this alternative is for the sole purpose of determining the level of EPA grant funding. This is because Orange County and the City of Orlando have agreed to eliminate the discharges of wastewater effluent to Shingle Creek from their respective facilities. To determine the level of grant funding, the EPA required, through its Advanced Treatment Review Process that two levels of treatment for nitrogen and phosphorus removal be evaluated. These are as follows:

a) Secondary treatment plus nitrogen and phosphorus control to 3 mg/l -- total nitrogen and 0.2 mg/l -- total phosphorus; and

b) Secondary treatment plus phosphorus control to 0.2 mg/l -- total phosphorus.

Shallow Well Injection

This alternative, called the Groundwater Conservation Program (GCP), involves the injection of highly treated wastewater effluent into the upper zone of the Floridan Aquifer. Reclaimed wastewater would be pumped from the treatment plants to injection areas and then distributed to injection wells. The injection wells would be spaced linearly at 1,000-foot intervals to minimize build-up of aquifer potentiometric levels. Each well would inject from 1.8 to 3.0 million gallons per day (mgd). Potential injection zones were selected based on proximity to existing wells, existing and projected land use, and hydrogeologic considerations. The concept of this alternative was developed as a means of replenishing the aquifer.

Citrus Irrigation

This alternative involves the slow rate irrigation of about 10,000 acres of existing citrus groves in western Orange County and eastern Lake County. The wastewater treatment level required for this alternative involves secondary treatment followed by filtration and high level disinfection. Under this alternative, land would not be acquired nor irrigation systems funded for citrus irrigation. Instead, renovated wastewater would be provided under pressure to the property lines of the groves. The grove owners would be responsible for the construction, operation and maintenance of their individual irrigation and distribution systems. Renovated wastewater from the treatment facilities would be pumped to a distribution center located near the center of the area of the proposed irrigation target area. A reserve storage reservoir, located south of the distribution center and east of Lake Ingram, would also be needed due to short-term minimum and peak irrigation and freeze protection requirements and scheduling. Required storage volume would range from about 900 to 2400 acre-feet. The reservoir would, therefore, require from 170 to 420 acres at a depth of about 5.5 feet. Average annual citrus irrigation rates were estimated to range from 26 to 72 inches, depending on local conditions.

Rapid Infiltration Basins

This method of effluent disposal involves application of treated effluent to infiltration basins located in the well-drained sandy soils of western Orange County. The infiltration basins would be constructed as long, narrow channels following the existing topography of the proposed sites. Effluent would be applied to

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flood the basins for a period of one to two weeks. The basins would then be allowed to dry for about the same period, or longer, before beginning the next wetting/drying cycle. Effluent percolating through the basins would enter the water table and move downward and/or laterally away from the site. Secondary treatment followed by filtration and high level disinfection was determined to be the required treatment level for this disposal method. This treatment level has been found to be an effective method of inactivating viruses and bacteria in wastewater effluents.

Deep Well Disposal

This alternative involves the injection of treated effluent into a highly transmissive rock zone containing waters saturated with salt. Potential injection zones must be separated from freshwater aquifers by confining layers which would prevent or significantly retard upward movement of the injected effluent. Potential injection areas were identified in extreme eastern portions of Orange and Osceola Counties, and in Brevard County. Specific sites were not identified due to the lack of adequate data regarding potential injection zones. A testing program would be required as an initial step in implementation of this alternative. If results of the testing program were satisfactory, actual sites for injection wells would be determined.

Combined Citrus Irrigation/Rapid Infiltration

This alternative involves the use of a combination of the citrus irrigation and rapid infiltration alternatives. The distribution center and citrus irrigation target area proposed under the citrus irrigation alternative are also proposed under this alternative. Wells would be used for satisfying peak citrus irrigation and freeze protection demand, eliminating the requirement for the storage reservoir. Rapid infiltration sites are identical to those proposed for the rapid infiltration alternative. However, fewer sites would be required under this alternative approach. These sites would be used to dispose of the renovated wastewater not directed to the citrus irrigation system. The treatment required is secondary treatment followed by filtration and high level chlorination.

On-Lot Disposal

This alternative involves the use of the combined citrus irrigation/rapid infiltration alternative, with on-lot systems (septic tanks) servicing about 2.3 mgd of the projected Year 2000 wastewater flow. Total flow to the citrus irrigation/rapid infiltration system would be reduced to approximately 41 mgd. Septic tanks would be used in projected low density residential development areas within the Urban Service Area having suitable soils.

No Federal Action

This alternative involves the use of septic tanks and locally funded subregional treatment facilities to treat the projected wastewater flow in excess of the existing design capacities of the Sand Lake Road and McLeod treatment facilities, i.e. 15 and 13 mgd, respectively. Approximately 2.3 mgd of the projected Year 2000 flow would be handled by septic tanks. Two subregional treatment facilities would be constructed to treat the remaining Year 2000 projected flow of 13 mgd. One of these subregional facilities (Northwest Subregional) would be located in the northwestern portion of the 201 Planning Area having a treatment capacity of 6 mgd. The other subregional facility would be constructed at the site of the existing Orangewood Lift Station located south of the Sand Lake Road facility. Treated wastewater effluent from the McLeod Road, Sand Lake Road and Orangewood Subregional plants would be pumped to the citrus irrigation/rapid infiltration facilities proposed in the combined alternative. The effluent from the Northwest Subregional facility would be disposed of by rapid infiltration at sites in the vicinity of the plant. Secondary treatment followed by filtration and high level disinfection is the treatment required at each facility.

No Action

This alternative would involve no action on the part of the 201 participants. The existing facilities would remain at their present capacities and allow continued discharge of effluents to Shingle Creek. This would result in the continued eutrophication and degradation of Lake Tohopekaliga. New development within the existing service area would be allowed to connect to the sewer system until the plant capacities were reached. Any additional development would provide their own wastewater treatment and disposal facilities. These would include septic tank systems and package wastewater treatment facilities. This alternative is not acceptable to either the state and federal regulatory agencies or the 201 participants. It would also result in serious conflicts with the Orange County Growth Management Policy's objective of using the provision of public services to direct and guide growth. The no action alternative is not considered a viable option, but is used for purposes of comparison with the "action" alternatives.

PART C - EVALUATION OF ALTERNATIVES

The alternatives described above were evaluated in terms of cost, operability, implementability and environmental impact. The evaluation of the alternatives with respect to these categories is summarized in Table 1.

TABLE 1

ALTERNATIVES EVALUATION SUMMARY

ALTERNATIVE	PRESENT WORTH COST (MILLION)	ENVIRONMENTAL IMPACTS	IMPLEMENTABILITY	OPERABILITY
Discharge to Shingle Creek a) Nitrogen & Phosphorus Control b) Phosphorus Control	 $230.66 205.26	1. Continued and increasing losses of water resource to surface water discharge. 2. Extent of Lake Tohopekaliga water quality improvement uncertain. 3. High electrical energy consumption. 4. Increased sludge production and disposal quantities.	1. Not acceptable to 201 participants or regulatory agencies.	1. Increased O&M requirements. 2. Sophisticated treatment systems and controls.
Groundwater Conservation Program	329.62	1. Greatest potential for flooding impacts to adjacent residential properties due to increased lake and groundwater levels. 2. Increases potential for sinkhole development in urban areas. 3. Increased stormwater runoff in areas of induced higher water tables. 4. Increases recharge to water supply aquifer by reuse of renovated effluent. 5. Eliminates discharge to Shingle Creek/Lake Tohopekaliga.	1. Regulatory constraints uncertain. 2. Public acceptance doubtful.	1. Increased O&M requirements. 2. Sophisticated treatment systems and controls.
Citrus Irrigation	177.20	1. Minimizes land required for land application of renovated wastewater. 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Increases recharge to water supply aquifer. 4. Increases in area lake levels and water tables. 5. Enhances productivity and viability of citrus industry.	1. Acceptable to regulatory agencies. 2. Growers willing to accept renovated wastewater for irrigation.	1. Use of renovated wastewater conditioned on effluent quality. 2. Cyclic irrigation demand requires large storage volumes for minimum and peak demand. 3. Treatment systems and controls generally reliable and not complex.
Rapid Infiltration Basins	160.24	1. Increases in area lake levels and water tables may affect property values. 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Increases potential for sinkhole development in rural areas. 4. Increases nutrient load to adjacent lakes via groundwater flow. 5. Increases recharge to water supply aquifer.	1. Acceptable to regulatory agencies. 2. Local acceptance of RIBs may require project modifications.	1. Treatment systems and controls generally reliable. 2. Hydraulic and renovative capability of basins may require modifications to project after commencing operation.
Deep Well Disposal	216.70	1. Continued and increasing losses of water resource to non-potable aquifer (reclaiming may be possible in future). 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Land required is minimal.	1. Requires location of suitable injection zone(s) and test well program.	1. Treatment systems and controls reliable.

TABLE 1
ALTERNATIVES EVALUATION SUMMARY
(Continued)

ALTERNATIVE	PRESENT WORTH COST (MILLIONS)	ENVIRONMENTAL IMPACTS	IMPLEMENTABILITY	OPERABILITY
Deep Well Disposal (Continued)			2. Generally acceptable to regulatory agencies, except for time required to implement.	
Citrus Irrigation/Rapid Infiltration Basins	$163.43	1. Decreases potential level of adverse impacts of total rapid infiltration basin alternative. 2. Eliminates discharge to Shingle Creek/Lake Tohopekaliga. 3. Increases recharge to water supply aquifer. 4. Enhances productivity and viability of citrus industry. 5. Aesthetic impacts of RIBs on surrounding properties could impact property values.	1. Acceptable to regulatory agencies. 2. Local acceptance of RIBs may require project modifications. 3. Growers willing to accept renovated wastewater for irrigation.	1. Dual disposal systems increases reliability and flexibility of disposal system. 2. Treatment systems and controls generally reliable.
On-Lot Systems	165.06	1. Conflicts with Orange County Growth Management Policy in Urban Service Area. 2. Septic tank usage in low and medium potential soils could impact lake water quality. 3. Somewhat reduces impacts of citrus irrigation/rapid infiltration basin alternatives, otherwise similar impacts anticipated.	1. Acceptable to regulatory agencies. 2. Local acceptance of RIBs may require project modifications. 3. Growers willing to accept renovated wastewater for irrigation. 4. Increased usage of septic tanks in Urban Service Area may be unacceptable to County.	1. Dual disposal system increases reliability and flexibility of disposal. 2. Treatment systems and controls generally reliable.
No Federal Action	175.10	1. Significant increase in sewer user fees and development costs. 2. Potential conflicts with Orange County Growth Management Policy due to location of Northwest Subregional plant and interceptor system, and septic tank usage in Urban Service Area. 3. Aesthetic impacts of Orangewood Subregional plant on existing land uses. 4. Somewhat reduces impacts of citrus irrigation/rapid infiltration basin alternative, otherwise similar impacts anticipated. 5. Septic tank usage in low and medium potential soils could impact lake water quality.	1. Acceptable to regulatory agencies. 2. Increased usage of septic tanks in Urban Service Area may be unacceptable to County. 3. Local acceptance of RIBs may require project modifications. 4. Growers willing to accept renovated wastewater for irrigation.	1. Increase in O&M required due to increase in number of treatment facilities and separate disposal facilities for Northwest Subregional system. 2. Dual disposal systems increases reliability and flexibility of disposal. 3. Treatment systems and controls generally reliable.

Cost

As can be seen from Table 1, the difference between the highest alternative present worth cost (i.e. groundwater conservation program) is more than twice the lowest alternative present worth cost (i.e. rapid infiltration basins). Three alternatives' present worth costs are within 10 percent of the lowest present worth cost, and can be considered to be essentially equivalent based on the level of precision of the cost analysis. Four alternatives, therefore, could have been selected for implementation based on the cost analysis. These are: (1) rapid infiltration basins; (2) citrus irrigation/rapid infiltration; (3) on-lot systems; and (4) no federal action. The latter three alternatives incorporate the combined citrus irrigation/rapid infiltration disposal method.

Operability

Review of the operability summary of Table 1 leads to the conclusion that the least flexibility would be afforded by the rapid infiltration basins alternative. Also, the no federal action alternative would increase the scale and complexity of the operation and maintenance effort required to treat and dispose of the projected wastewater flow. This is because two additional subregional treatment facilities and an additional disposal area would be required.

Implementability

With the exception of the no federal action alternative, the least cost alternatives would be equally implementable. The no federal action alternative would result in significantly increased user charges or development costs, or both. Public acceptance of significantly increased user charges would be very doubtful. Modifications or enhancement of project design criteria would be anticipated to be necessary with respect to potential aesthetic and property value impacts of the proposed RIBs on adjacent areas. Other obstacles to implementation would not be anticipated for these alternatives. The no federal action alternative would be anticipated to be the only alternative with significant implementation problems due to the impacts of increased user charges on public and development interests.

Environmental Impacts

Hydrogeologic modeling efforts conducted during the 201 planning effort indicated that the rapid infiltration basin alternative would result in a greater level of impact on lake and groundwater levels than those of the citrus irrigation alternative. This general category of impact is expected for all four least cost alternatives. Impacts on land uses, associated with increased groundwater and lake levels, would be anticipated to be less severe for the alternatives utilizing the combined citrus irrigation/rapid infiltration basin disposal method than the rapid infiltration basin alternative.

The most significant differences in the least cost alternatives incorporating citrus irrigation/rapid infiltration basins are associated with the no federal action alternative. This alternative includes two additional subregional treatment facilities, i.e. the Northwest Subregional and Orangewood Subregional treatment facilities.

The proposed location of the Northwest Subregional plant is in the Clarcona area of rural west Orange County. This plant site is outside the Urban Service Area and could create development pressure in the rural area adjacent to the site and along the interceptor corridor to the plant. The provision of sewer service to development in these areas would conflict with the Orange County Growth Management Policy.

The Orangewood Subregional treatment facility would be located at the site of the existing Orangewood Lift Station south of the Sand Lake Road facility. This is an existing residential area. Aesthetic and odor impacts to this area could occur.

Selection of the no federal action alternative, therefore, could result in potential adverse aesthetic and odor impacts on an existing residential community and potential conflicts with the Orange County Growth Management Policy due to induced growth. In addition, a relatively significant increase in sewer user charges would result.

PART D - DESCRIPTION OF THE PREFERRED ALTERNATIVE

Based on a systematic evaluation of the above alternatives and numerous subalternatives not discussed above, the citrus irrigation/rapid infiltration basin alternative was selected as the most cost-effective and environmentally sound alternative. This alternative was selected over the rapid infiltration and on-lot disposal alternatives on the basis of operational flexibility and cost, respectively. The 201 Planning Area and selected plan are depicted on Map 1.

The citrus irrigation/rapid infiltration basin alternative provides for the productive reuse of renovated wastewater on privately owned citrus groves in west Orange County and east Lake County. Utilization of this renovated wastewater is planned for both crop growth and freeze protection. Rapid infiltration basins will be used to dispose of the renovated wastewater which is not utilized for citrus irrigation. Peak irrigation and freeze protection demands will be supplemented using a system of about 56 supply wells strategically located throughout the renovated wastewater distribution system.

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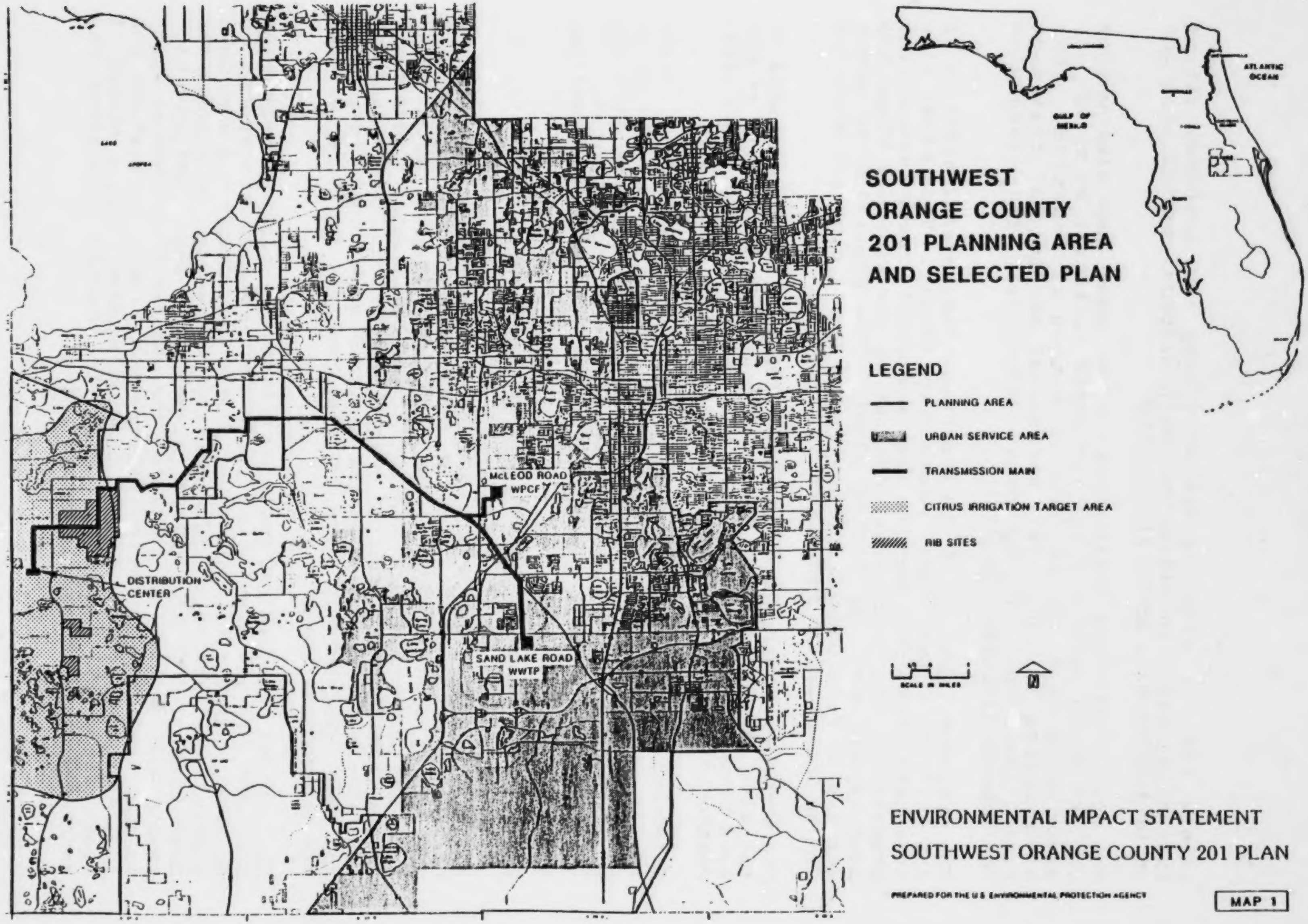

SOUTHWEST ORANGE COUNTY 201 PLANNING AREA AND SELECTED PLAN
LEGEND
PLANNING AREA
URBAN SERVICE AREA
TRANSMISSION MAIN
CITRUS IRRIGATION TARGET AREA
RIB SITES
SCALE IN MILES
McLEOD ROAD WPCF
SAND LAKE ROAD WWTP
DISTRIBUTION CENTER
ATLANTIC OCEAN
GULF OF MEXICO

ENVIRONMENTAL IMPACT STATEMENT

SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP 1

Federal funding will be requested initially for expanding and upgrading the Orange County Sand Lake Road and City of Orlando McLeod Road treatment facilities. Subregional systems for developing areas south of the Sand Lake Road facility are planned to be served by developer financed facilities to be owned and operated by Orange County. The flows from within the Urban Service Area portion of the 201 Planning Area will be transported to the two treatment facilities by a system of existing upgraded and new interceptors. A common 15.5 mile, 54-inch effluent transmission main will be utilized after the junction of two individual transmission mains from the two treatment facilities. Federal funding will be requested for the transmission mains and all remaining facilities which relate to effluent disposal.

The terminal point of the transmission main is the distribution center located near the Lake County line in western Orange County. Approximately 20 million gallons of renovated wastewater will be stored at the distribution center and pumped, as needed, to the citrus irrigation and rapid infiltration basin distribution system. The distribution system will supply the renovated wastewater, under pressure, to the grove owners' property lines. Construction, operation and maintenance of all required irrigation equipment and distribution piping on the grove owners' property will be the responsibility of the individual grove owners.

The final sites selected for rapid infiltration basins are depicted on Map 1. Less than 20 percent of the land area will be used for actual basin construction. Reforestation of the remaining site areas is planned in conjunction with retention of existing productive citrus and vegetated areas. Landscaped buffers are also planned in the immediate area of individual basins for visual screening purposes.

Management and costs of the proposed collection and treatment facilities will be the responsibility of Orange County and the City of Orlando. Capital costs for jointly used facilities will be shared equally by the entities in accordance with an interlocal agreement dated July 28, 1983 between Orange County and the City of Orlando. Operation and maintenance costs of the joint facilities will be allocated to the entities in proportion to their flow contributions. Increases of $8.50 and $4.50 per month in the average single family residential service charges are anticipated to be required for users in the County and City systems, respectively.

PART E - BASIS FOR DECISION

The EPA Headquarters Advanced Treatment Task Force has documented the need to upgrade the existing wastewater effluent discharges to the Shingle Creek/Lake Tohopekaliga basin. Cost analysis accomplished through the 201 Facilities Planning process indicated that land disposal options would be less costly to implement on a twenty-year present worth basis than upgrading the treatment levels and continuation of surface water discharge. These cost analyses also indicated that four alternatives could be considered as having essentially equal twenty-year present worth costs. Of these four alternatives, the combined citrus irrigation/rapid infiltration basin alternative was determined to provide the greatest flexibility for disposal. This was also found to be the most environmentally acceptable alternative. Treatment will be provided at the expanded and upgraded Sand Lake Road and McLeod Road treatment facilities and will consist of secondary treatment followed by filtration and high level disinfection,suitable for irrigation with unrestricted public access and human contact.

After the selection of this alternative, several project modifications were incorporated into the design of the project to mitigate the potentially significant impacts identified in this EIS and at public meetings and hearings. These modifications related to the location of the proposed disposal sites, control of lake and groundwater level increases, disposal site aesthetics, and loss of productive citrus areas.

Property owners adjacent to the originally proposed rapid infiltration sites were opposed to these sites because of their close proximity to their community. In addition, concern was expressed that the proposed use of these sites would decrease the value of their properties due to visual aesthetics and odors. As a result of their concerns, the proposed disposal sites were relocated to more acceptable locations, and a Reforestation Plan developed. The Reforestation Plan provides for the retention of existing naturally vegetated areas and productive citrus groves, the reforestation of barren areas, and provision of vegetated buffers around the individual basins. This is foreseen to effectively mitigate the potential aesthetic and odor impacts by enhancement of the existing vista.

Detailed geohydrologic modeling of the impacts of the proposed rapid infiltration basins on groundwater and lake levels was accomplished. This resulted in the establishment of an official County policy regarding maximum acceptable lake level increases for lakes adjacent to the disposal sites and a schedule of remedial actions. Lake level increases to a point eighteen inches below the 100-year flood level of the affected lakes was established as the elevations at which remedial operational procedures would commence. Evaluations of the results of the refined model and proposed operational procedures indicate that the impacts of concern can be effectively mitigated.

The state and federal regulatory agencies have indicated their concurrence with the EIS findings and the importance of the project. Implementation of the project is expected by mid 1986.

CHAPTER I

PURPOSE AND NEED FOR ACTION

CHAPTER I
PURPOSE AND NEED FOR ACTION

A. Purpose of the EIS

The National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, requires the preparation of an Environmental Impact Statement (EIS) for "major Federal actions significantly affecting the quality of the human environment." The purpose of the impact statement is to ensure that environmental and social factors are considered in addition to economic and technical factors during the decision-making process. To that end, the environmental impact statement is to present a detailed description of the environmental impact of the proposed action, any unavoidable adverse impacts that would occur if the action is implemented and alternatives to the proposed action.

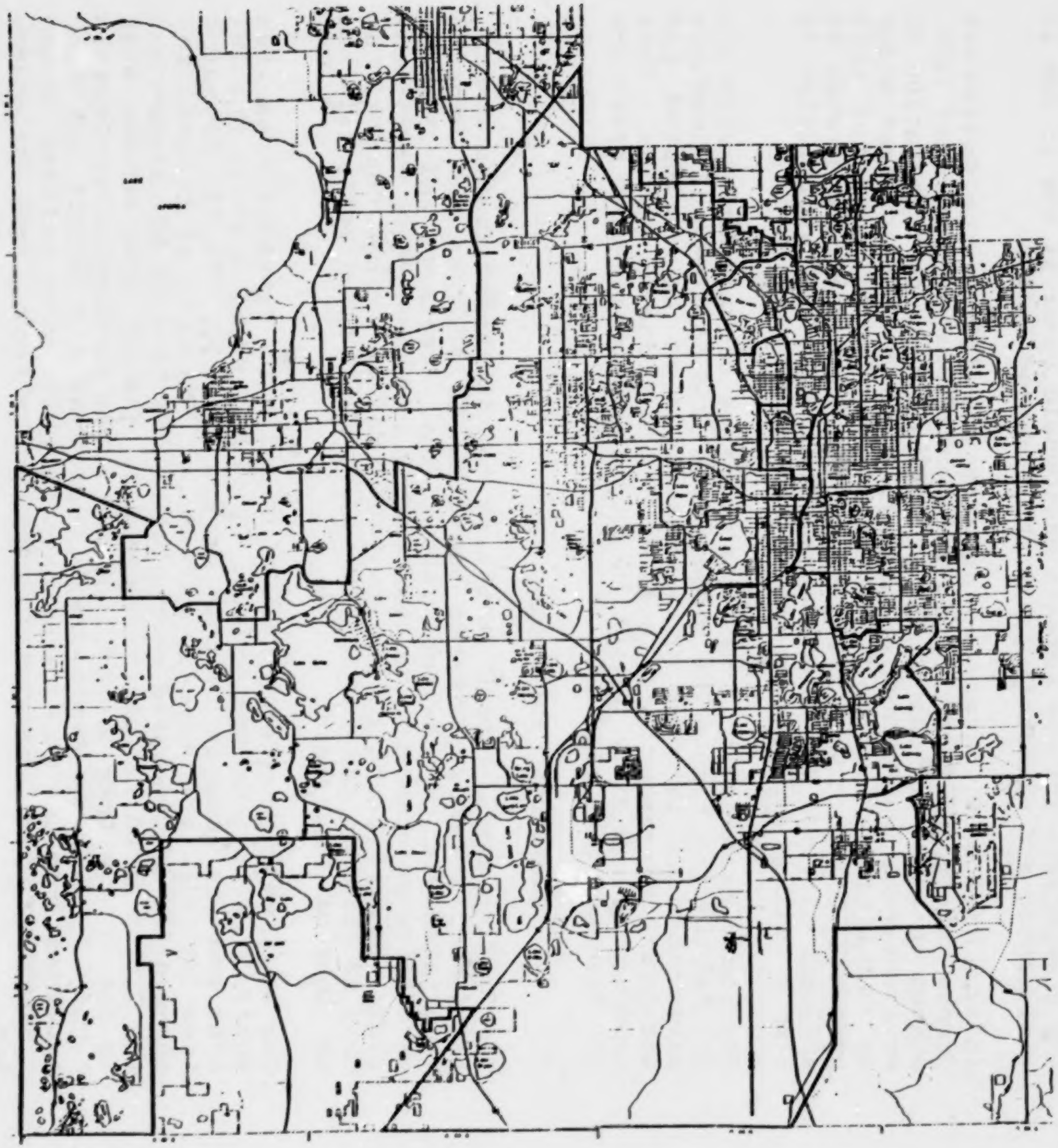
In the Notice of Intent to prepare the EIS on the Southwest Orange County 201 Plan, the Environmental Protection Agency (EPA) stated that the purpose of the study "is to ensure integration of environmental and economic considerations at the earliest stage of facilities planning." In the Directive of Work for this project, EPA further stated that "resolution of the issues of effluent disposal and user charges is required to avoid delay in Step 2 funding and project implementation."

For these reasons, this EIS was prepared concurrently with the 201 Facilities Plan. The "piggy-back" EIS approach allowed the environmental impacts of alternatives to be evaluated and considered during the selection of the proposed action. This approach helped avoid delays in project implementation after the 201 Plan was completed.

B. Background and Issues

The Environmental Impact Statement for Southwest Orange County, Florida, is being prepared in order to address the impacts associated with wastewater transmission, treatment and disposal facilities proposed in the Southwest Orange County 201 Facilities Plan. Participants in the project include Orange County, the City of Orlando, the City of Edgewood, the City of Belle Isle and the Town of Windermere.

The Southwest Orange County 201 Facilities Planning Area lies entirely within Orange County, Florida. Map I-1 shows the 201 Area and its location within Orange County. The 201 Planning Area includes the western portion of the City of Orlando and three other incorporated communities: the Town of Windermere and the Cities of Belle Isle and Edgewood. The 201 Area extends west to the Orange-Lake County line and south to the Orange-Osceola County line. The Reedy Creek Improvement District has been excluded from the study area because wastewater collection and treatment for the district is provided by Reedy Creek Utilities, Inc.


LAKE APOPKA

ATLANTIC OCEAN
GULF OF MEXICO

SOUTHWEST ORANGE COUNTY 201 PLANNING AREA

LEGEND

— PLANNING AREA BOUNDARY

SCALE IN MILES

N

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP I-1

The climate of the 201 Planning Area is subtropical, with a mean annual temperature of 72.5°F in Orlando. Rainfall is relatively high, with an annual average of 50.27 inches. Most of the rainfall occurs during the summer months, typically as afternoon thundershowers. Evapotranspiration is also relatively high in the Planning Area. Annual lake evaporation averages 47 inches which means that 93 percent of the average annual rainfall on lakes is returned to the atmosphere.

The land encompassed by the 201 Area includes a wide range of physical features. The western and northern portions of the Planning Area are typical of central Florida with numerous lakes interspersed among rolling hills. The soils are sandy and well-drained, and much of the land is covered by citrus groves.

The eastern and southern portions of the 201 Area are more typical of Florida's coastal lowlands. The landscape consists of broad open plains, pine flatwoods, and wetlands. The soils are sandy but tend to be poorly drained. The open plains are generally used for cattle grazing. The wetlands areas consist primarily of hardwood swamps. An extensive network of drainage channels has been developed to lower the water table and remove stormwater runoff in order to accommodate the development that has occurred.

Water is one of the most important natural resources of central Florida and southwest Orange County. Groundwater from the Floridan aquifer is used for potable, agricultural, and industrial water supplies. Surface waters provide a variety of recreational opportunities. The drainage divide between the St. Johns River and Kissimmee River basins crosses the 201 Area. The northern part of the Planning Area lies within the St. Johns River basin and includes large areas that have no surface outflow. Drainage is to the self-contained lakes in the area or to groundwater. The southern portion of the 201 Area drains south to the Kissimmee basin via Reedy, Shingle, or Boggy Creeks.

Southwest Orange County is one of the most rapidly developing areas in Florida and the United States. Growth in the area has been spurred by the development of tourist and manufacturing industries. One of the major industries in the area is citrus agriculture. However, the dominant factors in the area's growth during the 1950's and 1960's were the development of the aerospace industry at Cape Canaveral and the construction of the Martin-Marietta plant in southwest Orange County. Tourism emerged as a major industry in the late 1960's with the development of Walt Disney World.

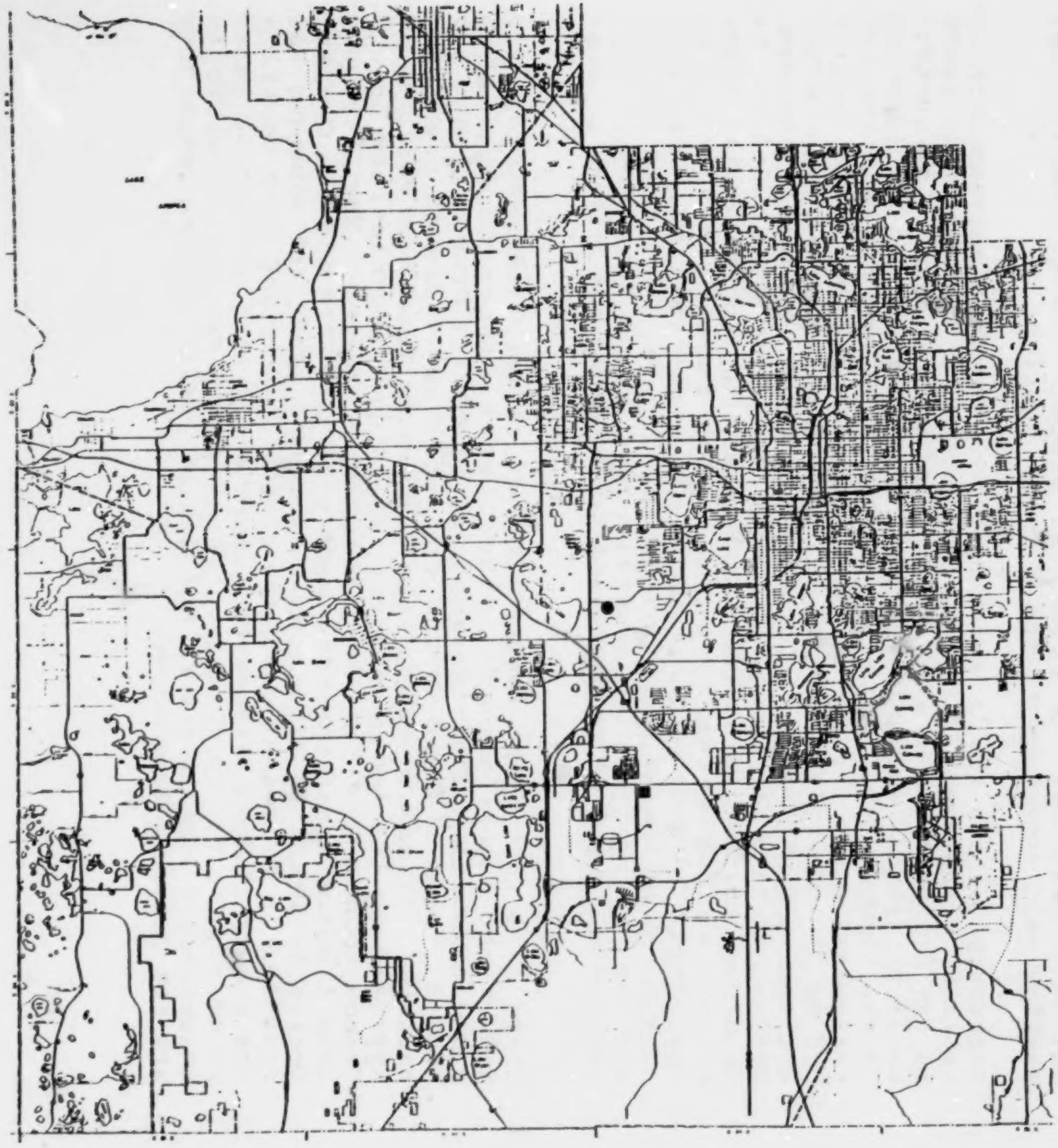
On May 20, 1980, the Orange County Board of County Commissioners adopted the Orange County Growth Management Policy. The Growth Management Policy provides a management process that encourages growth in highly developable areas corresponding to Orange County's ability to supply the necessary services. As a result of the policy, Orange County's 1000 square miles were divided into two major areas - the Urban Service Area and the Rural Service Area.

Wastewater collection, treatment and disposal within the 201 Area is accomplished by a combination of privately and publicly owned systems. The privately owned systems include domestic sewage treatment facilities and industrial waste treatment facilities. The publicly owned facilities are operated by Orange County and the City of Orlando. The City of Winter Park also owns and operates a small collection system in the Planning Area. Map I-2 shows the locations of the treatment facilities.

Orange County has two large central collection systems within the 201 Area. The Northwest Service Area collects wastewater from the Pine Hills, Lake Lawne, and Orlo Vista areas and pumps it into Orlando's McLeod Road System for treatment under a wholesale agreement with Orlando. The Southwest System collects wastewater from developed areas south and southwest of Orlando's McLeod Road service area. This wastewater is treated at the County's Sand Lake Road Wastewater Treatment Facility. The Sand Lake Road facility is an activated sludge plant with a design capacity of 15 mgd. The plant presently discharges to Shingle Creek, and is the only County facility which discharges to surface waters.

The City of Orlando Westerly Collection System serves essentially all developed areas of the Southwest 201 Area within the Orlando City limits. In addition, wastewater from Orange County's Northwest sewer system and the City of Winter Park's Asbury Park service area are pumped to the City's Westerly system for treatment. The wastewater from the Westerly Collection System is treated at Orlando's McLeod Road Wastewater Treatment Facility. The plant, which has a design capacity of 12 MGD, consists of a complete-mix activated sludge system followed by trickling filters for effluent polishing. The treated wastewater effluent is discharged to Shingle Creek.

Lake Tohopekaliga is the eventual receiving body for the waters of Shingle Creek. A great deal of attention has been focused on the trophic condition of the lake and the impact of point source discharges on the lake water quality. The Florida Game and Freshwater Fish Commission (FG & FWFC) has concluded that because of the deteriorating water quality in Lake Tohopekaliga, the lake will not be capable of supporting the recreational sportfishery at existing levels. FDER, as well as the Florida Game and Freshwater Fish Commission, determined that high nutrient loadings in Shingle Creek caused by wastewater treatment plant effluent were contributing to the eutrophication of Lake Tohopekaliga. In response to the Florida Department of Environmental Regulation's (FDER) "no discharge" requirement,



WASTEWATER TREATMENT FACILITIES

LEGEND

● McLEOD ROAD WASTEWATER TREATMENT PLANT

■ SANDLAKE ROAD WASTEWATER TREATMENT PLANT

--- PLANNING AREA BOUNDARY

SCALE IN MILES

N

ENVIRONMENTAL IMPACT STATEMENT
SOUTHWEST ORANGE COUNTY 201 PLAN

PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY

MAP I-2

both the City and the County have agreed to eliminate their discharges to Shingle Creek by 1988. A 201 Facilities Planning Program was begun to provide quality wastewater collection, treatment and disposal facilities in the Planning Area.

EPA determined that sufficient data were available to adequately establish discharge constraints for Lake Tohopekaliga. The EPA Headquarters Advanced Treatment Review Task Force evaluated the lake's water quality and determined effluent requirements. Further studies of water quality in Shingle Creek and Lake Tohopekaliga as part of the 201/EIS program were not necessary.

With the ban on further discharge to Shingle Creek, land application became the primary alternative for wastewater disposal. Other alternatives which were considered include ocean outfall, deep well injection in eastern Orange County, and shallow well injection to the Floridan aquifer.

Protection of the area's water resources is of primary concern in evaluating wastewater disposal alternatives. Residual pollutants in treated wastewater effluent can affect the quality of surface water or groundwater unless proper care is exercised in disposing of the wastewater. With the emphasis on land application for wastewater disposal, the potential impacts on groundwater quality had to be carefully considered. However, treated wastewater effluent represents a valuable resource, if properly managed. Effluents have been used in some areas of the country, to recharge groundwater aquifers and lakes, thereby replacing water withdrawn for water supplies. This possibility could be applicable in Orange County where low rainfall and increased pumping have lowered the potentiometric level of the Floridan aquifer during the past several years. Lake levels have also receded and resulted in decreased recreational usefulness of some lakes.

There is little doubt that additional sewage treatment capacity would encourage growth in Southwest Orange County. New development in western Orlando and southwest Orange County has recently been limited by the availability of sewage treatment capacity. Orlando's McLeod Road Wastewater Treatment Facility is approaching its design capacity of 12 mgd. Connections to the Orange County Sand Lake Road Wastewater Treatment Facility have been limited under the agreement with the FDER and the Consent Decree by EPA. The limitations on sewage treatment capacity has resulted in increased pressure on the County and City to allow the use of package wastewater treatment plants and septic tanks in this part of the County. These practices could result in unacceptable environmental and public health impacts when they are not properly maintained.

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Additional development in the Planning Area could result in secondary environmental impacts, such as the conversion of natural areas and unique agricultural areas to urban uses, and increase the demand for community services and facilities in Southwest Orange County. Increases in groundwater withdrawals for water supply to support this growth could result in further declines in groundwater and lake levels. Surface and groundwater quality could also be affected. The socioeconomic environment, including property values, could be impacted by any significant impact to the water resources of the Planning Area. With the desire of existing residents to maintain the present quality of life in this part of Orange County, the secondary environmental impacts of the growth to be accommodated by the proposed facilities has been a major issue in this study.

CHAPTER II

SELECTION AND DESCRIPTION OF PREFERRED ALTERNATIVE

CHAPTER II
SELECTION AND DESCRIPTION OF PREFERRED ALTERNATIVE

A. INTRODUCTION

This section will summarize the factors which led to the selection of the preferred wastewater management alternative. The decision to select the preferred alternative rather than one of the other alternatives was made on the basis of cost-effectiveness , anticipated operational reliability and flexibility, and environmental suitability.

Generally, EPA regulations allow a wastewater management alternative to be considered cost-effective if its present worth (life-cycle) costs are within ten percent of the least cost alternative and would not result in significant degradation of the environment. Other evaluative factors are also included in a cost-effectiveness analysis. There were eight wastewater management alternatives which were determined to have equivalent (less than 10% difference) present worth costs. Because it was concluded that the environmental impact evaluation did not result in the identification of potentially over-riding adverse impacts for any of the alternatives, any one of the eight least cost alternatives could have been selected for implementation.

The preferred alternative was not the least cost alternative. Therefore, cost was not the primary basis for the selection of the preferred alternative. Instead, operational flexibility and environmental concerns were major reasons for selection of the preferred alternative. Implementation of the combined citrus irrigation/rapid infiltration disposal option provides the beneficial reuse of the renovated wastewater by citrus irrigation, while maintaining the flexibility and reliability of an alternate disposal method. Environmental considerations which were important in the selection of the preferred alternative are discussed in the following section.

B. ENVIRONMENTAL CONSIDERATIONS

Two important differences were notable among the least cost alternatives. These were with respect to: (1) the effluent disposal method; and (2) the number of treatment facilities utilized. Six of the eight least cost alternatives included a three plant configuration, with one of the three plants being the potential new Northwest Subregional Facility. This facility was to be located outside the Urban Service Area and foreseen to be a source of developmental pressure and possible secondary growth in the Rural Service Area. Although the two plant configuration was selected because it does not require the design of a new treatment plant and limits the effluent disposal to one geographical area, its selection also eliminated the greatest potential for induced growth outside the designated Urban Service Area.

The combined citrus irrigation/rapid infiltration disposal option provides for the beneficial reuse of renovated wastewater associated with citrus irrigation. It also reduces the impact of the operation of the rapid infiltration basins (RIBs) on water table and lake levels, reduces the amount of land required for the RIBs, and minimizes the amount of storage required for citrus irrigation.

In general, the alternatives evaluation determined that the alternative selected has the least potential for resultant environmental impact of all of the alternatives evaluated. As with all of the land application alternatives considered in the 201 Facilities Plan, predominately beneficial impacts to area water resources are anticipated due to project implementation. The selected alternative will, most notably, eliminate the two most significant point source discharges to the Shingle Creek/Lake Tohopekaliga drainage area, and result in the recharge of area aquifers, including the Floridan. As a result of the project, a decreased eutrophication rate of Lake Tohopekaliga is anticipated and a significant amount of high quality renovated wastewater will recharge one of the area's most important water resources, the Floridan Aquifer. Although potential adverse impacts to water resources (e.g. excessive water table and lake level increases, lake water quality degradation, etc.) have been identified to be associated with the selected alternative, subsequent evaluations and mitigative measures incorporated into the design and operation of the project have effectively dealt with these concerns. The selected plan, depicted in Map II-1, is expected to have the least adverse impact on area water resources of the alternatives considered, and result in a significant net beneficial impact on the water resources of the County and region.

C. DESCRIPTION OF THE PREFERRED ALTERNATIVE

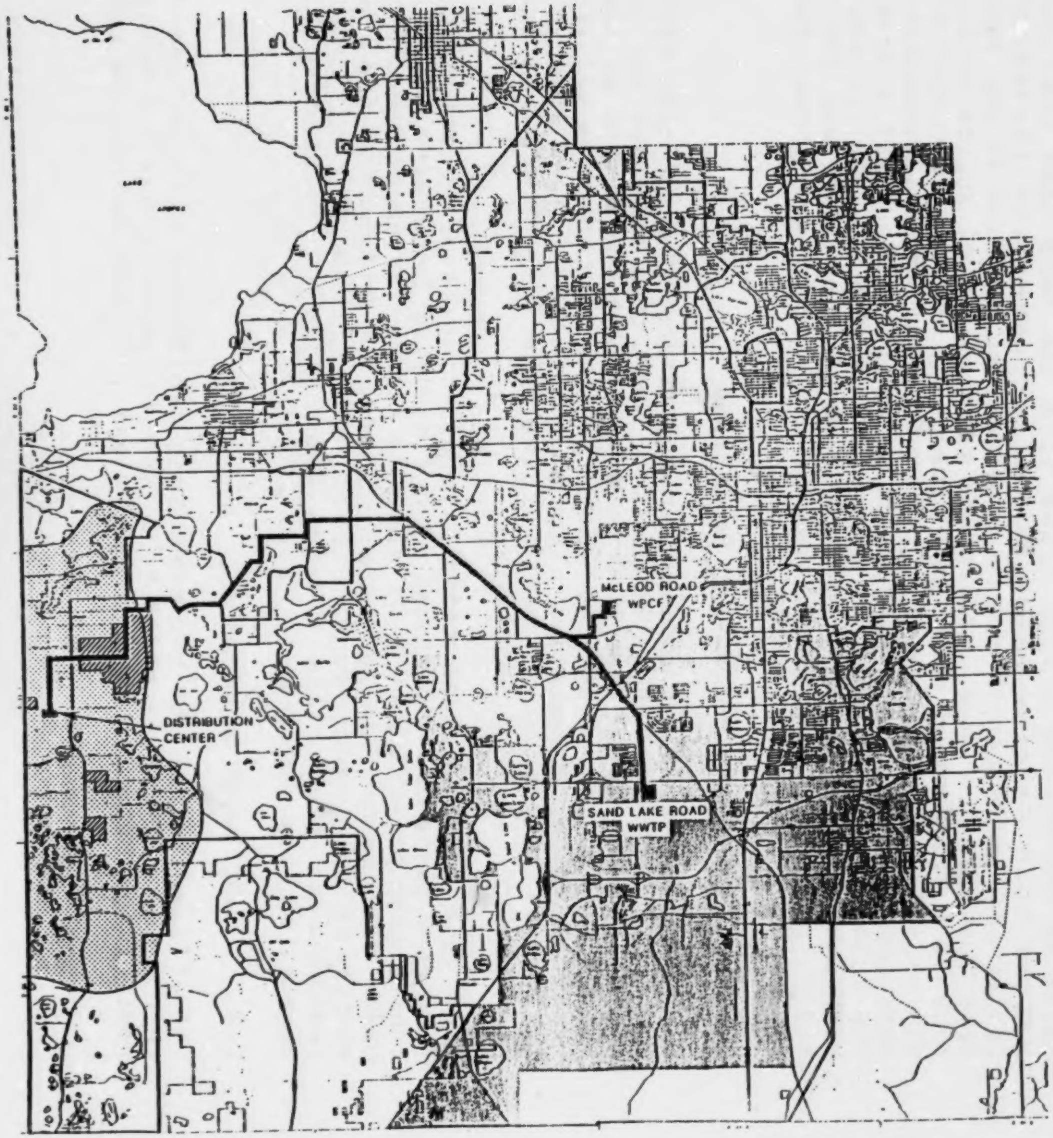
C.1 Service Areas/Interceptors

The Southwest Orange County 201 Planning Area is segregated into three distinct service areas:

- Sand Lake Road Service Area
- McLeod Road Service Area
- Rural Service Area

The Sand Lake Road Service Area encompasses approximately 15,000 acres. Design flow projections include allowances for residential, commercial and industrial contributions, as well as nonexcessive infiltration and inflow to the collection system. Industrial wastewater flows are low in strength because the major industries pretreat their flows prior to discharge to the County system.

SELECTED PLAN


McLEOD ROAD WPCF
SAND LAKE ROAD WWTP
DISTRIBUTION CENTER

LEGEND

— PLANNING AREA

▨ URBAN SERVICE AREA

━ TRANSMISSION MAIN

░ CITRUS IRRIGATION TARGET AREA

▨ RIB SITES

SCALE IN MILES

N

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MAP II-1

The McLeod Road Service Area encompasses approximately 38,000 acres and includes portions of the City of Winter Park's sewer service area and unincorporated areas of Orange County. As in the Sand Lake Road Service Area, design flow projections include allowances for residential, commercial, and industrial contributions, as well as nonexcessive infiltration and inflow contributions.

The Rural Service Area will be serviced by septic tanks. Developer financed subregional wastewater treatment facilities, to be owned and operated by Orange County, will service new growth in the unincorporated portion of the sewer service area south of the Sand Lake Road Service Area.

Construction of force mains, gravity lines, pump stations and expansion of some existing pump stations will be required in order to convey the design flows from the Sand Lake Road and McLeod Road Service Areas to their respective treatment facilities. Interceptor system improvements required in the Sand Lake Road Service Area involve the paralleling of approximately 17,900 linear feet of existing force mains and the expansion of six existing pump stations. These are required to accommodate anticipated development within the existing sewer service area. The McLeod Road Service Area interceptor system will be upgraded with new or expanded lift stations, new gravity lines and force mains, primarily along the routes of existing right-of-way and easements.

C.2 Wastewater Treatment Facilities

The improvements to the existing sewage treatment facilities will include expansion of the present secondary treatment systems to accommodate 23 mgd at the Sand Lake Road plant and 21 mgd at the McLeod Road plant. The McLeod Road facility improvements will be constructed on the existing plant site. An additional 26 acres of land will be acquired south of the Sand Lake Road plant for improvements to that facility.

Flow equalization, dual media filters, high level chlorination (chlorine gas), and additional sludge handling facilities will be constructed at each treatment plant to provide advanced secondary waste treatment. The projected effluent concentrations for the modified treatment facilities, as well as the effluent limitations set by the Florida Department of Environmental Regulation, are depicted in Table II-1.

C.3 Effluent Disposal

The effluents from the two treatment facilities will be pumped through 42-inch force mains to a junction point about 1.5 miles west of the McLeod Road treatment plant. At that point, the two

TABLE II-1

RAPID INFILTRATION BASIN DESIGN EFFLUENT QUALITY STANDARDS

Parameter	FDER Limits	Projected Concentration (mg/l) Average	Maximum
TSS	20	4	5
BOD_5	20	10	20
Total Phosphorus	--	4	4
Total Nitrogen	--	16	20
Nitrate-Nitrogen	12	2	8
pH	6-8.5	7	8.5

Source: Rapid Infiltration Basins Design Development Report; Camp Dresser & McKee, Inc.; April 1984.

lines will be joined and a single 54-inch pipeline will be constructed to the distribution center in West Orange County.

At the distribution center, 20 million gallons of storage will be provided and flows will be routed into the citrus irrigation distribution network or rapid infiltration basins as demand requires. Current commitments by grove owners to receive renovated wastewater total 20.9 mgd. This demand has been estimated to increase to an average of about 30 mgd by the Year 2000. The actual demand will be determined by the number of growers participating in the project. Any excess flow will be routed to the rapid infiltration basins. The target area for citrus irrigation is Southwest Orange County and Southeast Lake County. A network of pipelines will be constructed to carry the reclaimed effluent to citrus groves within the target area. Growers participating in the program will receive specific amounts of water for irrigation according to a written agreement with the City and County. The average application rate will be approximately 1 inch per week. The actual rate will be determined by the individual growers, due to variations in flow requirements during periods of extended rainfall or drought. A system of wells will be constructed along the route of the distribution system to satisfy peak irrigation demands which exceed the availability of renovated wastewater.

The rapid infiltration basins (RIBs) will be constructed on four separate RIB sites. Because the transmission main passes through the largest of the four sites, take-off piping will be installed to supply effluent directly to the basins on this site, thus bypassing the distribution center. The take-off piping will be designed to handle a peak flow of 75 mgd in order to provide for disposal of effluent during emergency peak flow conditions. Average loading estimates for each site are shown in Table II-2. The RIBs will be designed for infiltration rates of up to 6.4 inches per day, with provisions for a wetting period of 7 days and drying period of 7 days. The RIB berms outside of the basins will be sodded with Bermuda grass, and a spray irrigation system will be added for disposal of effluent on the berms. In addition to the aesthetic considerations, Bermuda grass, if harvested, can utilize up to 400 lbs. of nitrogen per acre per year. Minimal reduction in total nitrogen loads would be anticipated, however, due to the relatively small land area involved.

C.4 Sludge Management

Improvements or process modifications at the Sand Lake Road Wastewater Treatment Facility include: chlorine feed to three 50 foot diameter gravity thickeners for control of odors; replacement of existing aerobic digesters with new anaerobic digesters, which operate as closed systems with no venting to the atmosphere; and installation of four belt presses for sludge dewatering to reduce the need to dewater sludge on open drying

TABLE II-2

RIB SITE DESIGN DATA

SITE	AVERAGE FLOW (MGD)
5	1.03
6	10.22
7	3.14
9	1.49
Total	15.88

Source: Rapid Infiltration Basins Design Development Report; Camp Dresser & McKee, Inc.; April 1984.

beds during normal operations. In addition, the solids removal equipment for the secondary clarifiers will be modified to provide for uniform withdrawal of sludge. Stabilized solids will be trucked to the Orange County Model Landfill for final disposal.

At the McLeod Road Water Pollution Control Facility, two strategies for sludge handling are being considered. The first would involve odor control, thickening, anaerobic digestion, belt press dewatering and landfilling of sludge, all to be accomplished by the City of Orlando. The second strategy being considered is the privatization of sludge handling operations at City treatment facilities whereby a full service vendor would provide long-term sludge handling and disposal operations for the City. Privatization could eliminate, modify or delay construction of facilities that are currently under design for the first approach. It is unknown at this time which sludge management strategy will be implemented at the McLeod Road facility.

CHAPTER III

DRAFT EIS SUMMARY

CHAPTER III
DRAFT EIS SUMMARY

A. BACKGROUND OF THE STUDY

This EIS was initiated by EPA Region IV in May, 1978 when Orange County and EPA signed a Memorandum of Understanding. This provided that an Environmental Impact Statement would be prepared "in connection with the planning, design, and construction of proposed treatment works in Orange County pursuant to Section 201 of Public Law 92-500...". Orange County is the lead agency for the preparation of the 201 Wastewater Facilities Plan. The 201/EIS grant application was formally submitted to EPA and FDER in August, 1979 and work commenced early in 1980. Major issues to be addressed in the EIS are outlined in Chapter I.

The purpose of this chapter is to summarize the Draft EIS. More detailed information on the background, data and evaluation techniques leading to the decisions in the Final EIS can be found in the Draft EIS which is available from EPA.

B. WASTEWATER FLOWS

Projections of future wastewater flows are the building blocks upon which every wastewater management study is based. Flow projections affect facilities' sizing, location and staging. Wastewater flow projections for the Southwest Orange County 201 Plan were developed utilizing a combination of 208 agency population and land use projections, estimates of existing per capita wastewater generation rates, existing and post rehabilitation infiltration and inflow rates, an evaluation of existing land uses, and EPA approved methodologies for projecting industrial wastewater flows. Due to the area's large tourist attractions and the climate of the Planning Area, transient (tourist and seasonal) populations are an important consideration when projecting wastewater flows.

B.1 Sewer Service Areas

Alternatives developed and evaluated in the 201 Plan and evaluated in the EIS were based on two major considerations: (1) Orange County Growth Management Policy (GMP) regarding the provision of public services and facilities to control growth; and (2) existing sewer service areas.

As a result of the Orange County GMP, the Planning Area is essentially divided into two distinct areas (i.e. Urban and Rural Service Areas) based on existing developed areas and the level of public facilities and services to be provided. The Urban Service Area, which generally surrounds concentrations of existing developed areas, is to be provided with public services at a higher (urban) level. The purpose of designating an area for the provision of urban services is to allow higher intensity land uses within a smaller land area and, therefore, provide more cost-effective services. Urban services are discouraged within the Rural Service Area. Wastewater treatment and disposal within the Rural Service Area is to be provided by on-lot or other privately owned and operated systems. The 201 Facilities Plan, therefore, did not address alternatives for centralized wastewater management in the Rural Service Area.

Within the Urban Service Area portion of the Planning Area there are two distinct wastewater service areas: (1) the Sand Lake Road Service Area; and (2) the McLeod Road Service Area. The northern boundary of the Sand Lake Road Service Area coincides with the southern boundary of the McLeod Road Service Area. Areas served by the Sand Lake Road treatment facility include populated areas south of the City of Orlando, the Dr. Phillips community, and areas north of the treatment facility to Interstate 4 and south to the Orangewood development area. The McLeod Road Service Area includes the extreme western portions of the City of Orlando, the City of Winter Park's Asbury Park service area, and developed areas of unincorporated Orange County north of the Sand Lake Road Service Area to, and including, the Pine Hills community. Treatment of the wastewater flows generated in the unincorporated areas of Orange County and within the McLeod Road Service Area is provided through an agreement between Orange County, which owns and operates the collection and interceptor systems, and the City of Orlando, which owns and operates the treatment facility.

Development of alternative future sewer service areas was generally considered only for the McLeod Road service area. Expansion of the Sand Lake Road service area was not considered. Wastewater management in the Urban Service Area portion of the 201 Planning Area south of the existing Sand Lake Road Service Area will be provided by developer financed, County owned and operated subregional facilities. One exception to this is explained later in this Chapter for the No Federal Action alternative. Three alternative future service area configurations were evaluated for the McLeod Road treatment facility. These involved various alternatives for serving areas not currently served and revising flow direction of existing interceptors to divert flows from certain areas to an alternate treatment facility site in the Clarcona area of northwest Orange County.

.B.2 Population and Land Use

Population projections for the Planning Area were derived through the input and involvement of various agencies. The process of projecting population involved the use of EPA approved state derived projections by County. These projections are utilized by the 208 Agency (the East Central Florida Regional Planning Council) as control numbers to develop regional projections. The

208 Agency in association with the respective City and County planning officials work together to allocate the resident and transient population projections to smaller areas called traffic zones.

There are 140 traffic zones, or portions of traffic zones, located in the 201 Planning Area. Traffic zones located in urbanized areas are significantly smaller in area than those located in rural areas with small populations. A total of 122 of these traffic zones are wholly or partially located within the Urban Service Area portion of the Planning Area. Estimates of existing and projections of future population and land use in five-year increments to the Year 2000 were available for use in projecting wastewater flows. Land use projections were classified into residential, commercial and industrial categories. Certain assumptions regarding the future level of services in the two major sewer service areas were necessary in order to develop design populations. Year 2000 served (design) populations were developed based on the assumptions that:

- All existing served population will continue to be served.
- All future additional population in the Urban Service Area will be served.
- All existing unserved population in the City of Orlando will be served.
- All existing unserved population in unincorporated Orange County will continue to use septic tank systems.

Some exceptions to the above were made, including their incorporation into certain alternatives (e.g. No Federal Action and On-Lot Systems).

The resident population in the Planning Area is projected to increase from 181,542 in 1980 to 295,740 in the Year 2000. Transient population is expected to increase from 25,945 to 69,211 during this period. More detailed information, including data for individual traffic zones, is found in the Draft EIS which is available from EPA.

B.3 Wastewater Flow Projections

Wastewater projections were accomplished using the population projections and the estimated existing per capita wastewater generation rate derived for the existing system. Non-excessive infiltration/inflow and industrial flows were added to base flow figures. Flow projections were then developed on an equivalent population basis. Equivalent population was defined as the permanent residential population plus 80% of the transient population. This is because the wastewater generation rate from this segment of the population are less than those of permanent residents. Contributions from domestic, commercial, institutional and small industrial sources are accounted for in the average daily base flow (ADBF) generation factors.

Allowances for significant industrial wastewater flows were developed separately and added to the average daily base wastewater flows. Industrial wastewater projections were broken into three parts: (1) existing; (2) known planned increases; and (3) unplanned increases. Unplanned increases were accounted for by traffic zone using the greatest of either: 5% of the sum of the ADBF, I/I and known industrial flows; or 25% of the known industrial flows. These methods are in accordance with approved EPA procedures.

Total ADBF, I/I and industrial Year 2000 projected flows were developed by traffic zone for the Urban Service Area portion of the 201 Planning Area. Projections for nine of the traffic zones were adjusted in the 201 Plan to account for existing and committed growth in their areas because existing flows were determined to be greater than the flows projected for the Year 2000. A total of 43.1 million gallons per day of wastewater is anticipated to be generated in the Year 2000 from within the Urban Service Area portion of the 201 Planning Area. In conformance with County Growth Management Policies, this does not include any existing or projected wastewater generated in the Rural Service Area portion of the 201 Planning Area. As stated above, wastewater generated in the Rural Service Area is to be treated and disposed of by on-lot or other privately financed systems.

C. WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives were developed for the four major components of a complete wastewater management system: (1) wastewater collection; (2) wastewater treatment, (3) effluent disposal, and (4) sludge treatment and disposal. Combinations of the components generated numerous alternatives that were considered in the 201 Facilities Plan. Many of these alternatives were eliminated from consideration due to feasibility and economics. The alternatives that were developed fully for possible implementation are summarized in this Section.

The wastewater collection system alternatives include treatment facility service areas, major pump stations and interceptors. Wastewater treatment alternatives were developed to provide the required effluent quality for each of the effluent disposal alternatives because they are dependent on the effluent disposal alternative being considered. Quantities and types of sludges generated by wastewater treatment will vary depending on the treatment level and process and, therefore, are also related to the effluent disposal alternatives.

C.1 Service Areas/Interceptors

Only the Urban Service Area portion of the 201 Planning Area was considered in the process of developing alternative service area configurations. Interceptor system alternatives were developed for each of the four service area alternatives in the Draft 201 Alternatives Analysis (October 1, 1982). These systems were screened based on feasibility and costs to select an interceptor configuration for each of the service area alternatives.

During the 201 alternatives screening process, it was decided that the area south of the existing Sand Lake Road Service Area would be served by developer-built subregional plants because the flows from this area would be from new growth. Therefore, the Urban Service Area south of the McLeod Road Service Area was split into four individual service areas, with newly developing areas to be served by three developer-built subregional facilities. This and the existing Sand Lake Road and McLeod Road facilities service area boundary served to constrain the Sand Lake Road Service Area to its existing configuration.

The Sand Lake Road Service Area and interceptor requirements are the same for each service area/interceptor alternative. The interceptor improvements are primarily to upgrade existing lines to provide additional capacity. Parallel force mains in two areas and modifications to six pumping stations were found to be necessary to meet future flow requirements. The total projected flow to the Sand Lake Road Treatment Facility is approximately 23 mgd.

Alternatives for serving the remaining portions of the Urban Service Area involved use of the existing McLeod Road Water Pollution Control Facility and a potential new (i.e. Northwesterly Subregional) treatment facility located west of the Clarcona area. The most cost-effective interceptor configuration was determined for each of the four service area alternatives.

For Service Area Alternative 1, the wastewater from the area generally north of Silver Star Road would be routed to the Northwest Subregional Treatment Facility, which would be designed for a projected flow of 5 mgd. The McLeod Road treatment facility would be expanded to treat a projected Year 2000 flow of 16 mgd and would serve the area generally south of Silver Star Road to the Sand Lake Road Service Area boundary. Two alternative interceptor routes were developed in the McLeod Road Service Area for this service area configuration.

For Service Area Alternative 2, the wastewater flow from the Pine Hills-Orlo Vista area and the area around Lake Orlando (formerly Lake Wekiva) would be routed to the Northwest Subregional plant, which would be designed for a projected Year 2000 flow of 10 mgd. The wastewater from these areas is presently treated at the McLeod Road facility. The flow from the remainder of the service area would be routed to the McLeod Road facility, which would remain at its existing capacity and treat a projected flow of 11 mgd.

The interceptor system proposed for Service Area Alternative 3 would be similar to the previous alternative, except that the wastewater flow from the area around Lake Orlando would be routed to the McLeod Road treatment facility. The McLeod Road plant would be designed for a projected flow of 14 mgd while the Northwest plant would be designed for 7 mgd. Except for the area around Lake Orlando, the interceptor system tributary to the Northwest plant would be the same as for Service Area Alternative 2.

For Service Area Alternative 4, all of the wastewater flow from the northern portion of the 201 Service Area would be treated at the McLeod Road plant, which would be designed for a projected flow of 21 mgd. The Northwest Subregional plant would not be constructed under this alternative.

C.2 Wastewater Disposal

Four general categories of wastewater disposal options were identified and considered in the development of the 201 Facilities Plan: (1) surface water discharge; (2) land application; (3) groundwater injection; and (4) ocean outfall. Using these four categories, seven disposal alternatives were chosen during the initial Phase 1 screening process of the facilities planning program. These alternatives were developed further and evaluated during Phase 2. The seven alternatives are summarized below within their respective disposal categories.

Surface Water Discharge

The alternative of continued discharge to Shingle Creek involved identification of acceptable effluent discharge criteria as described in the EPA Advance Treatment (AT) Task Force Evaluation. These EPA discharge options were analyzed only from the standpoint of determining the EPA funding level for the project because the Florida Department of Environmental Regulation (FDER) will not permit continued discharges to Shingle Creek. In 1981, the County entered into a consent decree with the U.S.E.P.A., et. al, to cease surface water discharge of effluent to Shingle Creek on a schedule beginning in 1985, and resulting in zero discharge by March, 1988. The City of Orlando negotiated a similar schedule with FDER, et. al, to cease surface water discharge of effluent to Shingle Creek.

Land Application

Land application alternatives identified and considered in the development of the 201 Plan included: (1) spray irrigation using a cover crop; (2) spray irrigation on citrus groves; and (3) rapid infiltration basins. The purchase of land for slow-rate irrigation was eliminated from further consideration due to excessive costs based on evaluations performed in the Southwest Orange County Land Spreading Feasibility Report of March, 1981. Spray irrigation on citrus groves and rapid infiltration basins were determined to be the most viable options for consideration.

(1) Citrus Irrigation

The citrus irrigation alternative would involve distributing filtered, highly disinfected effluent to citrus groves. Highly treated reclaimed wastewater may be used on, over or under citrus trees if the citrus is to be processed. For citrus sold as fresh fruit, only under-tree systems would be allowed.

The effluent disposal system for the citrus irrigation program would include a transmission system to carry the effluent from the Sand Lake Road and McLeod Road treatment facilities to a distribution center in west Orange County. From the distribution center, the effluent would be pumped to the citrus growers' property lines for irrigation. The distribution system would not provide piping for on-farm irrigation systems. The growers' existing irrigation systems would be utilized for application of the reclaimed effluent.

The average irrigation demand for citrus groves has been estimated at approximately one inch per week. During certain times of the year, when irrigation demands are low, storage areas for holding approximately 30 to 90 days of flow may be needed to contain excess effluent. During other periods, the irrigation demand may exceed one inch per week.

The required treatment level for citrus irrigation is secondary treatment for BOD, suspended solids removal to 5 mg/l, and high level disinfection.

(2) Rapid Infiltration

This alternative would utilize land application via rapid infiltration basins (RIBs). Rapid infiltration basins (RIBs) are high rate systems which are alternately wetted and allowed to dry. Hydraulic loadings of 20 to 400 feet per year have been used on other rapid infiltration basins. However, the FDER does not allow rates in excess of 9 inches per day (5.6 gallons per day per square foot). Wetting and drying cycles are used in RIB operation to help maintain the long-term infiltration capacity of the soils. Occasional tillage is also required to restore the infiltration capacity of the surface layer soils. This land application method can provide a relatively high degree of effluent renovation with proper site conditions and careful operation. Treatment levels required for RIB disposal were set by the FDER and are identical to those of the citrus irrigation alternative.

(3) Combined Citrus Irrigation - Rapid Infiltration

These alternatives were combined so as to utilize the benefits of citrus irrigation while providing for variations in irrigation demand/requirements. The rapid infiltration basins would eliminate the need for large surface storage reservoirs. In addition, the amount of land required for rapid infiltration basins would be significantly reduced. This alternative would, therefore, provide greater flexibility than either of the individual alternatives. The required treatment level would be identical to those of the individual disposal alternatives.

Groundwater Injection

(1) Deep Well Injection

Deep well injection entails the pumping of treated wastewater into nonpotable aquifer zones having a total dissolved solids content greater than 10,000 mg/l. A deep test well was drilled in 1977 to a total depth of 6,193 feet near the Sand Lake Road treatment facility to investigate the viability of deep well injection in that area. This test well terminated in dense basement rock. Subsequent testing revealed that the permeability of deep potential injection zones (containing saline water) was low, and the zones were highly susceptible to plugging. The deep well disposal of wastewater within the 201 Area was, therefore, determined to be uneconomical due to the high pressures required. Further analysis outside the 201 Area led to the selection of two potential areas located approximately forty miles east and sixty miles southeast of the Sand Lake Road Wastewater Treatment Facility , in Brevard and Indian River Counties, respectively. The required level of treatment is secondary treatment.

(2) Groundwater Conservation

Shallow well injection of highly treated wastewater into the potable Floridan aquifer was also considered in the 201 Plan under the Groundwater Conservation Program (GCP). In Orange County, the Floridan aquifer generally consists of two zones. The lower zone is the primary producing zone where the major water supply wells obtain their supply. About 400 existing storm water drainage and lake level control wells discharge into the upper zone of the aquifer.

Existing data and regulations associated with the discharge of highly treated effluent into the groundwater were reviewed extensively. Some of the existing data evaluated included hydrogeologic features, water quality, existing drainage and supply well quality. Sampling and testing programs were performed on existing wastewater influent and effluent, as well as in the lower and upper zones of the aquifer. Unit treatment processes and potential treatment methods were analyzed for cost-effectiveness.

Preliminary design criteria for the injection wells included: a linear well configuration; consideration of water table buildup from adjacent wells; maximum upper zone pressure buildup of 20 feet of water; maximum water table elevation buildup of 15 feet; flow equalization at the treatment plant for constant pumping rate capabilities; well spacing of 1,000 feet; and an allowance of 100 feet of controlled area surrounding each well (i.e. a minimum wellfield width of 200 feet). Total wellfield area required was estimated to be approximately 103 to 112 acres. The wellfield would be located as close as possible to the treatment facilities in order to minimize water transmission costs. Advanced treatment to meet primary and secondary drinking water standards is the required treatment level for this alternative.

Ocean Outfall

Construction of an ocean outfall, directing effluent into the Atlantic Ocean, would involve a 68 mile pipeline with pipe sizes ranging from 66 to 108 inches. This alternative was eliminated following the preliminary analysis due to relatively high costs and complex implementation issues resulting from the wide variation in flow and correspondingly large pipe sizes.

C.3 Wastewater Treatment Facility Options

The use of three regional wastewater treatment facilities was evaluated for the Southwest Orange County 201 Facilities Plan. The Sand Lake Road Wastewater Treatment Facility (WWTF) is situated east of Interstate 4 on Sand Lake Road adjacent to the Martin-Marietta industrial complex. The McLeod Road Water Pollution Control Facility (WPCF) is located east of State Road 435 and south of McLeod Road. The Northwest Subregional WWTF would be a new facility, proposed to be located just west of the Clarcona area. Three proposed developer-built subregional facilities would be located south of the Sand Lake Road WWTF service area.

Wastewater treatment alternatives were developed for each of the feasible combined service area/interceptor and wastewater disposal options. Five basic treatment levels were considered: (1) secondary; (2) secondary followed by filtration and high level disinfection (3) secondary with nitrification, denitrification and phosphorus removal to 0.2 mg/l; (4) secondary with phosphorus removal to 0.2 mg/l; and (5) advanced treatment to meet drinking water standards. These treatment levels are related to the method of disposal and are included in the summaries of each of the disposal alternatives.

Wastewater treatment unit process alternatives were developed for each of the above mentioned treatment levels. The least cost treatment train was selected from a present worth analysis for each effluent requirement.

C.4 Sludge Treatment/Disposal

The amount of solids produced by each of the alternatives associated with the Sand Lake Road, McLeod Road and Northwest Subregional facilities are detailed in Table III-1. Depending on the wastewater treatment process selected, the sludges will be primary plus either biological and/or chemical. Chemical sludges would be produced only with the Groundwater Conservation Alternative and those alternatives associated with surface water discharge because of the lime treatment required to remove phosphorus. Sludge process alternatives evaluated include a combination of thickening, stabilization, conditioning and dewatering.

The least cost sludge processing method for wastewater treatment alternatives at the Sand Lake Road and Northwest facilities is centrifuge thickening of the biological waste activated sludge followed by anaerobic digestion and dewatering by a belt filter press. The least cost method for the lime sludge would be gravity thickening followed by vacuum filter dewatering.

The least cost organic sludge processing method for the McLeod Road WPCF would depend on its design flow. For design flows of 15.5 mgd and 20.5 mgd, gravity thickening of primary sludge, centrifuge thickening of secondary sludge, anaerobic digestion of thickened sludges and dewatering of digested sludge using a belt filter press would be the preferred treatment train. At flows of 10.9 mgd and 13.7 mgd, the least cost processing method would be centrifuge thickening of secondary sludge and dewatering of digested sludge using belt filters. For inorganic sludge, the least cost method for all flows includes sludge storage and dewatering by vacuum filtration.

Several sludge disposal options were considered: (1) landfill; (2) incineration/landfill; (3) co-incineration/landfill; (4) landspread; (5) heat dry/market; and (6) compost/market. Of these, landfill at the Orange County Model Sanitary Landfill was chosen as the least cost method for use in developing the wastewater management alternatives.

C.5 On-Lot Treatment/Disposal Alternatives

Several alternatives were considered for on-site and small system treatment methods. These include (1) septic tanks and drain fields; (2) intermittent sand filters; (3) aerobic treatment units; (4) disinfection units; and (5) wastewater segregation and recycle systems.

The septic tank option was the only alternative evaluated in detail in the 201 Plan. This was because septic tank systems are widely used, have cost advantages over other on-lot systems, and are traditionally accepted in the area. It was determined that

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TABLE III-1

QUANTITY OF SOLIDS PRODUCED AT PROPOSED TREATMENT FACILITIES[1]

LIQUID TREATMENT PROCESS LEVEL	SAND LAKE ROAD WWTF[2]	MCLEOD ROAD WPCF				NORTHWEST SUBREGIONAL WWTF		
		S.A.Alt. 1[3] (15.5 mgd)	S.A.Alt.2 (10.9 mgd)	S.A.Alt.3 (13.7 mgd)	S.A.Alt.4 (20.5 mgd)	S.A.Alt.1 (5.0 mgd)	S.A.Alt.2 (6.8 mgd)	S.A.Alt.3 (9.6 mgd)
Secondary	46,000	38,600	21,000	24,500	50,900	10,000	13,600	19,200
Secondary + Filtration	47,050	38,800	21,000	24,500	50,900	10,200	13,900	19,650
Secondary w/Nitrification/ Denitrification + P (0.2 mg/l)	136,000	133,200	90,200	104,400	174,800	29,550	40,200	57,750
Secondary + P (0.2 mg/l)	176,200	127,400	86,700	101,400	168,500	30,300	52,100	73,500
Advanced Treatment	34,000	43,600	23,000	26,000	57,200	7,400	10,000	14,200

[1] Least cost alternatives for specified levels of solids processing/disposal (all quantities in lbs. dry solids/day).

[2] Quantity of solids produced at the Sand Lake Road WWTF is the same for all service area alternatives.

[3] Service Area alternative.

Source: Southwest Orange County, Florida
201 Facilities Plan, Draft; October, 1983;
Tables 5-5, 5-6, 5-7

up to 2.3 mgd of the projected wastewater flow from the Urban Service Area could be treated by septic tanks. This was based on serving low density residential development located in suitable soil conditions within the Urban Service Area. The remaining wastewater flows in the Urban Service Area would be collected, treated and disposed of via centralized systems. Centralized treatment and disposal would be accomplished using the combined citrus irrigation/rapid infiltration alternative.

C.6 No Federal Action Alternative

The no federal action alternative would involve the use of septic tanks and locally funded subregional treatment facilities to treat the projected wastewater flow in excess of the existing design capacities at the Sand Lake Road and McLeod Road treatment facilities. The combined citrus irrigation/rapid infiltration alternative would be used for disposal of the effluent from the Sand Lake Road, McLeod Road and subregional treatment facilities. In this alternative, all of the proposed improvements would be funded locally with no federal grant participation.

Septic tanks would be used for wastewater disposal for projected low density residential development in the Urban Service Area. A total of 12,169 new septic tank systems were considered feasible in the Urban Service Area. The areas chosen were based on soils with high or medium potential for septic systems, as well as the distance from a centralized collection system. Approximately 2.3 mgd of the projected Year 2000 wastewater flow could, therefore, be accommodated by septic tanks. The remainder of the flow would be collected and treated at the existing treatment plants or at the new subregional treatment facilities.

The Sand Lake Road and McLeod Road treatment facilities would be allowed to reach their existing flow capacities of 15 and 13 mgd, respectively. Both plants would provide secondary treatment followed by filtration and high level disinfection. The effluent would be pumped through a common transmission line to the distribution center in west Orange County, as proposed for the combined citrus irrigation/rapid infiltration alternative. The Northwest Subregional Treatment Facility would also be constructed to provide secondary treatment plus filtration and high level disinfection for a design flow of 6 mgd, and the effluent would be disposed of by rapid infiltration basins in the vicinity of the facility. A subregional treatment facility would also be constructed at the site of the existing Orangewood Pumping Station, south of the Sand Lake Road facility, to provide a similar treatment level for a design flow of 7 mgd. The effluent would be pumped through an existing force main to the Sand Lake Road WWTF where it would be repumped with the Sand Lake Road Plant effluent to west Orange County for disposal by citrus irrigation/rapid infiltration.

D. EXISTING NATURAL ENVIRONMENT

This section provides a brief description of the existing natural environment of the Planning Area.

D.1 Surface Water Resources

Two major river basins drain the Southwest Orange County 201 Planning Area. These are the Kissimmee and St. Johns River Basins. The basin divide generally occurs at or south of the State Road 50 corridor which traverses the County in the east-west direction.

Within the 201 Area, the St. Johns River Basin includes the Big Wekiva, Little Wekiva, Lake Apopka and a small portion of the Howell Branch drainage basins. The St. Johns River drains north toward Jacksonville where the river discharges to the Atlantic Ocean. Within the Planning Area, most surface drainage in the St. Johns Basin is generally internal to the groundwater aquifer and/or land locked lakes. These lakes have neither surface inflow nor outflow and rely on rainfall or groundwater inflow to replenish the water lost to evaporation.

The south half of the 201 Area is within the Kissimmee River Basin and includes the Reedy Creek, Cypress Creek, Bonnet Creek, Shingle Creek, and Boggy Creek drainage basins. Surface water within the Kissimmee Basin drains to the south and eventually discharges to the Atlantic Ocean in South Florida.

Surface water quality within the 201 Area has been significantly degraded by stormwater runoff from urban areas and by discharges of wastewater effluent. The additional loadings of organic materials and nutrients to surface waters within the 201 Area has resulted in low dissolved oxygen levels in streams and accelerated eutrophication of lakes. These problems are particularly severe in the Shingle Creek basin. Extensive channelization has reduced the natural assimilative capacity of Shingle Creek, further aggravating the water quality problems caused by urban runoff and wastewater discharges.

Orlando's McLeod Road Water Pollution Control Facility and Orange County's Sand Lake Road Wastewater Treatment Facility currently discharge to Shingle Creek. Their discharges have contributed to the severely degraded water quality of Shingle Creek, causing violations of dissolved oxygen criteria and excessive nutrient levels.

Lake Tohopekaliga is the eventual receiving body for the waters of Shingle Creek. Based on the results of water quality studies in the Lake Tohopekaliga basin, the Florida Game and Freshwater Fish Commission has concluded that nutrient loadings from sewage treatment plants are directly responsible for the deterioration of the lake's water quality. In addition, the U.S. EPA Advanced Treatment Task Force completed an evaluation in January, 1983 of the condition of Lake Tohopekaliga. The Task Force found that the lake is exhibiting signs of increased eutrophication. Based on the evaluation, EPA recommended the substantial reduction of nutrients, particularly phosphorus, from point source discharges and the control of existing and future nonpoint sources within the lake's drainage basin in order to improve water quality.

Existing water quality and hydrologic conditions in other surface waters essentially eliminate the possibility of an alternative discharge site within the 201 Area. There are no streams or lakes with adequate size or assimilative capacity to receive the discharge of large volumes of wastewater effluent without serious degradation of water quality.

D.2 Groundwater Resources

Groundwater is the source of potable water in Orange County and occurs under both nonartesian and artesian conditions. Artesian conditions prevail in West Orange County and occur where the water is confined and rises in wells above the point at which it is first encountered. The heights to which water rises in tightly cased wells that penetrate an artesian aquifer define its confined potentiometric head. The confined potentiometric head may be above, below, or at the same level as the water table, depending on local conditions.

D.2.a Floridan Aquifer

The Floridan aquifer is the most productive aquifer in the 201 Planning Area. In Orange County the Floridan is artesian and includes several geologic formations, including the permeable parts of the overlying Hawthorn Formation that are in hydraulic contact with the rest of the aquifer. The clayey sand of the Hawthorn Formation retards the vertical movement of water between the water table aquifer and the underlying limestone of the Floridan aquifer.

The aquifer stores large quantities of water in caverns or solution channels. It also acts as a conduit, conveying water through cavities from areas of recharge to areas of discharge. In Orange County, the aquifer contains two major producing zones separated by a relatively impermeable zone, which lies 600 to 1,000 feet below the land surface. The water supply wells for the Cities of Orlando and Winter Park are developed in the lower zone. Many domestic and small public supply wells withdraw water from the upper zone.

Most of the recharge to the Floridan aquifer in Orange County originates as rainfall within the County. Some recharge occurs by underground flow from Southeastern Lake County and Northeastern Polk County. Recharge occurs whenever the water table is above the confined potentiometric surface. Additional recharge is provided by approximately 400 drainage wells in Orange County.

Potentiometric levels of the Floridan aquifer in Orange County fluctuate significantly in response to extremes of precipitation. Increased rainfall can be offset by increased pumpage. There has been a definite long-term trend of decline in potentiometric levels due, possibly, to increased pumpage and reduced precipitation.

Major discharges from the Floridan aquifer in Orange County include: spring outflows; upward leakage into the St. John's Marsh and Rock Springs Marsh; outflow into northern Lake County, Seminole County, and Brevard County; and pumpage within the County. Spring outflows are located primarily in Northwest Orange County and Southwest Seminole County.

The water quality of the Floridan aquifer has been monitored closely because of the extensive use of the aquifer as a source for public water supplies. The water quality within the aquifer appears to be relatively constant with location and depth beneath the 201 Area. The water contains moderate levels of hardness, dissolved solids, and chlorides beneath the 201 Area, but the levels increase in eastern Orange County as a result of residual salt water in the aquifer. Dissolved solids and chloride concentrations in the Floridan aquifer increase to approximately 2,000 mg/l and 1,500 mg/l, respectively, near the St. Johns River in eastern Orange County.

D.2.b Secondary Artesian Aquifers

In Orange County, several secondary artesian aquifers occur locally within the confining beds of the Hawthorn Formation and less extensively within the formations above the Hawthorn. These aquifers are usually found at depths ranging from about 60 to more than 150 feet below the land surface and are composed of discontinuous shell beds, thin limestone lenses or permeable sand-and-gravel zones.

The potentiometric level of the secondary artesian aquifer fluctuates slightly less than 5 feet, similar to the magnitude of the fluctuation in the nonartesian aquifer. Response of the potentiometric surface to rainfall is less rapid than the response of the water table but in general, both rise and decline similarly during wet and dry seasons. Recharge to the secondary artesian aquifers in Orange County is by downward leakage from the nonartesian aquifer in most parts of the County or by upward leakage from the Floridan aquifer.

The quality of water in the secondary artesian aquifer varies depending on the location, composition, and depth of the formation. In most areas of Orange County, the potentiometric surface of the secondary artesian aquifer is below the water table, allowing water to leak downward from the water table aquifer. As a result, the water quality in the secondary artesian aquifer is similar to that of the water table aquifer. In certain areas where the potentiometric level of the Floridan aquifer is greater than that of the secondary artesian aquifer, upward leakage will occur from the Floridan aquifer. In these areas, the water quality of the secondary artesian aquifer will be similar to that of the Floridan aquifer.

Generally, the water in the secondary artesian aquifer is less mineralized than that of the Floridan aquifer, but more mineralized than that of the water table aquifer. The dissolved solids concentration in the secondary artesian aquifers usually ranges from 100 to 400 mg/l.

D.2.c Nonartesian Aquifer

The nonartesian or water table aquifer extends over the majority of the County and is composed mainly of quartz sand with varying amounts of clay, hardpan and shell. In most parts of Orange County, the base of the aquifer is approximately 40 feet below the land surface. However, in parts of the highlands region (western Orange County), the nonartesian aquifer may extend to greater depths. Its permeability and thickness vary.

The water table in Orange County ranges from approximately zero to 20 feet below the land surface except below some of the sandhills in the western part of the County where it may be considerably deeper. In the lowlands and flatwoods sections, the water table is usually within a few feet of the land surface. The water table conforms in a general way to the configuration of the land surface, but it is usually at greater depths under hills and may be above the land surface in low swampy areas.

D.3 Ecological Resources

Terrestrial ecological communities in the 201 Planning Area consist of various combinations of plant and animal communities. The natural vegetation in Orange County includes mixed hardwood and pine forests located in areas with suitable soil and moisture characteristics. In other areas, where the sandy soils are deep and excessively drained, a scrubby vegetation exists consisting of scrub live oak, sand pine, a few turkey and bluejack oak, saw palmettos and grasses.

The type of animal community present is significantly determined by vegetation or human factors. Vegetation is the basis of the food chain, and is consumed directly or indirectly by all animals. The human factors determining the animal community make-up include hunting and habitat alteration. Wetlands are the most ecologically significant areas. This is because the majority of the different plant and animal species (e.g. 56% of all tree species and 34% of bird species) are located in or associated with wetland areas. Relatively few plant and animal species are associated with the upland and flatland areas. There are three wetland communities identified by the Orange County Growth Management Policy (GMP). These communities extend into the Planning Area, and are as follows: Cypress Domes and Strands; Freshwater Marshes; and Hardwood Swamp Forests.

Florida has developed a well diversified natural aquatic flora. Aquatic plants commonly found in water bodies in the Planning Area include pickerel weed, water hyacinth, spatterdock, fanwort, rushes, bladderworts, cattail, arrowroot, and emergent grasses. Climatic conditions, which are so ideal for native plant growth, also contribute to an aquatic weed problem which has developed in the State's waterways over the years. In addition to the warm, moist climate, other factors contributing to this problem are the long growing season and the abundance of nutrient-rich water bodies. Not only is excessive growth of native aquatic plants a problem in Florida, but exotic plants, which have been introduced accidentally or on purpose, have created some of the most severe infestations. For the most part, native plants are controlled by natural controls which have developed over thousands of years, such as other plants and animals or insects. However, plants which have been introduced from outside of the United States such as water hyacinth and hydrilla generally have no such controls or are better able to compete for food and growing space.

Data collected by the Orange County Pollution Control Department indicate that several nuisance plants are found in the Planning Area and that some are creating problems. Probably the most commonly reported nuisance aquatic plants are water hyacinth, hydrilla, water lettuce, duckweed, and aquatic grasses such as arrowhead.

Aquatic vegetation is vital to the life of any water body. The basic role of all green plants, including microscopic algae and vascular macrophytes, is to remove dissolved nutrients from their aquatic environment, utilize these nutrients for growth and respiration and produce oxygen. This process of photosynthesis is one of the most important biological processes taking place in any water body because the oxygen produced is essential to aquatic animals and is necessary for chemical oxidation processes which take place in the water body. Rooted and floating aquatic plants (macrophytes) also provide food, surfaces for egg attachment, and shelter for an array of aquatic animals. Over 46 species of fish have been identified as having a range which includes the 201 Planning Area. Amphibians and reptiles are also quite abundant.

None of the terrestrial communities existing in the Planning Area and impacted by the project were found to be rare or unique.

D.4 Topography, Geology and Soils

Planning area topography is generally flat in the eastern portion with gently rolling hills in the western portion. The flat lands typically consist of swampy areas or have seasonally high water tables. Due to their lack of topographic relief, they are characterized by poor drainage. Generally, the western portion of the Planning Area is characterized by sinkhole depressions and lakes with good localized drainage.

The Southwest Orange County 201 Planning Area has been divided into the following two topographic regions:

(1) Intermediate regions where elevations are generally between 35 and 105 feet; and
(2) Highland regions where elevations are generally above 105 feet

The intermediate region is characterized as exhibiting good to very poor recharge potential. It has many lakes in some areas and none in others. Surface streams in the intermediate region usually recede to very low flow or are dry after relatively short periods of drought. Good recharge areas generally occur in the areas immediately adjacent to the highlands region. Areas of very poor recharge potential generally occur in areas of the southeast part of the Planning Area and between the Orlando and Mount Dora Ridges.

The highland region is characterized by many lakes and depressions with few surface streams. This region is generally the most effective natural groundwater recharge area. The highest land in the Planning Area occurs in the Lake Apopka drainage basin at the Orange-Lake County line. A minimum elevation in the Planning Area of about 60 feet (mean sea level) occurs at various locations in the Big Wekiva and Little Wekiva drainage basins.

Soils found in the Planning Area are typically fine sandy clays and fine sandy loams, with some peats and muck. Most of the soils are very permeable; however, seasonal water tables are near the surface in some parts of the 201 Area. Where long term water tables have persisted, hardpan layers have developed and act further to impede the downward movement of water. Various soils in the uplands regions do not, however, contain hardpan layers or clays in the upper five feet of their profiles. More information on the geology has been incorporated into the previous discussion entitled Groundwater Resources (Section D.2) and will not be duplicated in this section.

D.5 Air Resources

Photochemical oxidants are the major pollutants of concern in Orange County. Ozone is the most common photochemical oxidant, accounting for more than 90% of the group. Hydrocarbons are essential to the formation of photochemical oxidants, combining with nitrogen oxides in the presence of sunlight to form these oxides. High level automobile use and associated gasoline filling stations in the Orlando-Orange County area are considered to be the cause of excessive hydrocarbon production.

Major areas of odor complaints are related to sewage treatment plants, sewage collection systems, hydrogen sulfide from well water, and manufacturing and construction industries. Sources of odor from sewage treatment facilities may include stale or septic wastewater influent, improper operation or overloading of treatment processes such as trickling filters or anaerobic sludge digestion, open drying of sludge and sludge lagooning. Odors may also result from sewage lift stations when the sewage becomes septic, as may occur during equipment failure. Other potential odor sources include industrial plants and water treatment plants which use aeration to strip hydrogen sulfide to the atmosphere.

E. EXISTING MAN-MADE ENVIRONMENT

The following paragraphs briefly describe the existing man-made environment in the Planning Area.

E.1 Land Use and Development Controls

The 201 Planning Area comprises 149,639 acres. It has been separated into an Urban Service Area and a Rural Service Area as a result of the Orange County Growth Management Policy (GMP). The policy's intent is to support the Land Use Policy Guide which advocates encouraging generally high density development in the Urban Service Area while discouraging high density development in the Rural Service Area. Minimizing the costs of providing urban services is the goal of this policy.

The Orange County Growth Management Policy contains policies for the orderly extension of public services to undeveloped portions of the Urban Service Area. These policies include provisions for the development of a 5-year capital improvements plan for the expansion of water and sewer systems. Development which occurs outside of the planned system expansions is required to construct and finance interim facilities, or assist in the financing of system extensions which are not included in the 5-year capital improvements plan. Implementation of these policies minimizes the economic impact to the County and serves to effectively guide growth.

The Urban Service Area is intended to have a full range of urban services, including central water and sewer, fire protection, transportation access, primary drainage, schools, libraries, recreation, and health facilities, which either presently exist or are planned to be available by the Year 2000. The Rural Service Area is that area of the County which is not included in the Urban Service Area. It generally contains agricultural and rural residential development which do not require urban levels of service. This area is characterized by the use of septic tanks, individual wells, unpaved streets with stabilized bases, and rural levels of police and fire protection.

The western half (west of Lake Down and Lake Tibet Butler) of the 201 Planning Area is rural with lakes scattered throughout the landscape. Land uses vary between agricultural production of citrus crops and vacant lands consisting of forests, wetlands and other undeveloped lands. With the exception of the Reedy Creek Improvement District, there are no public centralized water or sewer systems in the western half of the Planning Area. Scattered homes generally appear on lots of a minimum of one acre in size. The only urban development is the Town of Windermere where homes are found generally on lots no smaller than one-half acre. Commercial and industrial uses are extremely limited in this western portion of the 201 Area.

Within the eastern half of the Planning Area, urban development intensifies from the Butler Chain of Lakes into the City of Orlando. Single family residential development is clustered in subdivisions. Multi-family development extends to the limits of sewer service areas.

Various commercial and industrial areas exist throughout the 201 Area. Tourist-related businesses predominate in the vicinity of the International Drive corridor. Other retail and general commercial centers dominate arterial highways. Industrial areas include the Lockhart area, the Community of Taft and the Orlando Central Park industrial center. Other land uses, such as institutional and recreational, are generally scattered throughout the Planning Area.

E.2 Community Services and Facilities

There are over 40 educational facilities located in the 201 Planning Area. These facilities are public, private, higher and vocational. The Orange County Board of Public Instruction has sole responsibility for the facilities and services in public schools. Private facilities are owned and/or operated by a church, private organization or corporation.

Public library services are provided by the Orlando Public Library System, which is funded on a Tri-County basis by Orange, Seminole and Osceola County. The main library is located in downtown Orlando, with three branch libraries located within the Northwest and McLeod Road Service Areas. The remainder of the Northwest Service Area is handled through a bookmobile service.

Law enforcement is primarily the function of the Orange County Sheriff's Department and the Orlando Police Department. The Sheriff is responsible for the unincorporated portions of the 201 Area, and currently provides a uniform level of service on a County-wide basis. This uniformity of service is based upon population distribution and workloads within the districts, established by the Sheriff's Department. The Orlando Police Department operates in the municipal portions of the Planning Area, and provides services in a similar manner to the County's chief law enforcement officer.

Like law enforcement, fire protection is provided by Orange County and Orlando for their respective jurisdictions. Most of the property within the Orlando fire service areas is adequately covered, and has central water with fire hydrants. Orange County government has only been in the fire protection business for a short time, having consolidated the six independent fire districts within the 201 Service Area into a County-wide system. At this time, Apopka maintains the only independent fire district. Protection to the Planning Area is provided by the Lockhart, Apopka, Pine Hills, Holden Heights, Orlo Vista, Pine Castle and Taft fire stations. Some of these stations provide a higher level of service, and future growth can probably be handled with minimal impact, provided essential levels of urban water service are also provided.

Brookwood Hospital, located on Mercy Drive, is the only hospital within the service area. Over the last several years, three new private health care facilities have been constructed on Silver Star Road, Orlando-Vineland Road and Oak Ridge Road, which has helped to provide outpatient services to residents in the areas of new growth.

Water and wastewater services are provided within the service areas by a combination of County, City and private utilities. Solid waste collection is handled by the City of Orlando and within the County by private franchise agreements. The County maintains the Tropical Drive transfer station for solid waste, which in turn is transported to the County's Model Sanitary Landfill on the east side of the County. Orlando owns the only incinerator in the Planning Area which is adjacent to the McLeod Road Water Pollution Control Facility.

Both Orange County and the City of Orlando have centralized their administrative functions in downtown Orlando, although the County does maintain three branch service centers for elected and appointed officials outside the 201 Facilities Planning Area. The administrative facilities are confined to North Hughey Avenue on the eastern edge of the proposed McLeod Service Area. This area contains the Orlando Municipal Justice and Federal and State Governmental offices. The County maintains the Sheriff's Operation and Detention Facility and Public Works offices at 33rd Street.

E.3 Economic Resources

The 201 Planning Area relies heavily on the agricultural and tourism industries. While the tourism industry has expanded, the agricultural industry has held relatively stable. Mechanization has limited job growth potential. In addition, due to an increased emphasis on defense spending at the national level, employment at the Martin-Marietta Orlando Aerospace Corporation has increased. The presence of the aerospace industry in Orange and Brevard counties laid the foundation for the area's best growth potential, i.e. the electronics industry. Skilled engineers and technicians associated with the electronics industry has attracted additional companies to the Orlando area.

Increases in nondurable goods manufacturing employment in Orange County reflects the County's dominance in this sector. The largest industry within the nondurable goods sector is the manufacturing of food and kindred products. Food industry employment accounted for 40 percent of all area nondurable goods manufacturing in 1980. Almost half of the area's food employees are involved in the production of canned, bottled and frozen fruits and vegetables. The area's location near highly productive agricultural areas makes it a logical food processing center. Almost one-tenth of Florida's food manufacturing employees work in the Orlando Metro Area.

The services sector in the Orlando Metro Area has a very high rate of growth. This rate is more than three times the national growth rate. Included in this category are personal, repair and business services; medical services; amusement, recreation and entertainment services; hotels; and legal, educational and social services. The most important subcategory is amusement services, including employment at Disney World, Sea World and Circus World, as well as at the many small tourist attractions. Hotels and motels are also significant contributors to the area's economy. The area's concentration of tourist attractions and services has made the Orlando area the world's number one vacation center. In 1979, Disney World alone attracted 13.8 million guests.

E.4 Archaeologic and Historic Resources

A cultural inventory consisting of prehistoric and historic sites was compiled from the background review for the 201 Facilities Planning Area. The prehistoric sites currently are not considered eligible for listing in the National Register of Historic Places. The historic sites, however, are eligible and are considered potential National Register nominations. The historical sites are in the Orlando vicinity which was the earliest settled area and the first commercial center in Orange County.

It is generally agreed that the Orlando vicinity received influences from the cultures of the Central Florida Gulf Coast, the St. Johns River basin, the Indian River area and north central/south Florida aboriginal cultures. The type of aboriginal site most commonly encountered is the habitation site or area. These sites are of various culture periods, indicating that prehistoric occupation of the area occurred over a long period of time.

Habitation areas, as well as other types of sites, are commonly located along sandy ridges near fresh water lakes. Site distribution is closely dependent upon natural features such as drainage, elevation and proximity to water. Stream banks and the terraces above them are also potential site locations.

E.5 Wastewater Facilities

Wastewater collection, treatment and disposal within the 201 Area is accomplished by a combination of privately and publicly owned systems. The privately owned systems include domestic sewage treatment facilities and industrial waste treatment facilities. The publicly owned facilities are operated by Orange County and the City of Orlando. The City of Winter Park also owns and operates a small collection system in the Planning Area.

Orange County has two large central collection systems within the 201 Area. The Northwest Service Area collects wastewater from the Pine Hills, Lake Lawne, and Orlo Vista areas and pumps it into Orlando's McLeod Road System for treatment under a wholesale agreement with Orlando. The Southwest System collects wastewater from developed areas south and southwest of Orlando's McLeod Road service area. This wastewater is treated at the County's Sand Lake Road Wastewater Treatment Facility. The Sand Lake Road facility is an activated sludge plant with a design capacity of 15 mgd. The plant presently discharges to Shingle Creek, and is the only County facility which discharges to surface waters.

The City of Orlando Westerly Collection System serves essentially all developed areas of the Southwest 201 Area within the Orlando City limits. In addition, wastewater from Orange County's Northwest sewer system and the City of Winter Park's Asbury Park service area are pumped to the City's Westerly system for treatment. The wastewater from the Westerly Collection System is treated at Orlando's McLeod Road Wastewater Treatment Facility. The plant, which has a design capacity of 12 mgd, consists of a complete-mix activated sludge system followed by trickling filters for effluent polishing. The treated wastewater effluent is discharged to Shingle Creek.

New development in western Orlando and southwest Orange County has recently been limited by the availability of sewage treatment capacity. Orlando's McLeod Road Wastewater Treatment Facility is approaching its design capacity of 12 mgd. Connections to the Orange County Sand Lake Road Wastewater Treatment Facility have been limited under the agreement with the FDER and the Consent Decree by EPA. The limitations on sewage treatment capacity have resulted in increased pressure on the County and City to allow the use of package wastewater treatment plants and septic tanks in this part of the County. These practices could result in unacceptable environmental and public health impacts when they are not properly maintained.

F. IMPACTS OF THE ALTERNATIVES

This section provides a summary of the potential impacts associated with the fully developed wastewater management alternatives considered in the 201 planning process. Impacts are discussed with respect to the following wastewater management topics:

1. Service Area/Interceptor
2. Wastewater Disposal
3. Wastewater Treatment Facilities
4. Sludge Treatment/Disposal

In addition, the On-Lot Treatment/Disposal and No Federal Action alternatives are discussed separately. Due to its unacceptability to State and Federal regulatory agencies and local management agencies, the No Action alternative was not considered to be implementable and, therefore, utilized only to establish baseline conditions.

F.1 Service Area/Interceptors

Potential impacts related to the service area/interceptor alternatives were identified for ecological resources, population and land use, economy, community services and facilities, archaeological and historical resources, and air quality/odor/noise. A summary of the findings in each category is presented below.

Ecological Resources

Impacts resulting from interceptor construction were evaluated with respect to plant, animal and aquatic communities. All of the alternatives, with the exception of Alternative 4, were found to cause no significant impacts on ecological resources. Interceptor Alternative 4 involves paralleling an existing interceptor which crosses a hardwood swamp forest wetland and would require drawdown of the water table during construction. Hardwood swamp forest is considered to be an ecologically significant vegetation type. The destruction of this vegetation during construction would be a potentially significant impact. However, because previous construction through the areas did not result in a permanent change in vegetation, it is assumed that the proposed construction would not permanently impact the vegetation. Permanent impacts will result from projected urban development due to the availability of wastewater treatment service. However, none of the ecosystems in the portions of the Urban Service Area which are planned to be developed are considered rare or unique. Existing wetland areas were designated as "conservation" areas in the County's Growth Management Policy.

Population and Land Use

Interceptor routes and the provision of central sewer service were the most important considerations in evaluating the primary and secondary impacts of the service area/interceptor alternatives on land use. The 201 Plan considers the provision of centralized sewer service only in the Urban Service Area. This is in support of the County's Growth Management Policy (GMP). The removal of agriculturally unique areas (citrus groves) for development activities within the Urban Service Area will occur under the County's approach to growth management within the urban area. There were approximately 8,500 acres of unique agricultural soils located in the Urban Service Area portion of the 201 Planning Area. Approximately 4,900 acres of active citrus were located in these soil areas, with the remaining acreage (i.e. 3,600 acres) primarily vacant land with scattered residential uses. The Orange County GMP projected that approximately 31 percent of the existing vacant and agricultural soils areas would remain at the end of the twenty-year planning period. According to Orange County tax assessment records, there were 54,000 acres of citrus in Orange County in 1983, which is about 3,000 acres more than reported in the Orange County GMP for 1976. Therefore, regardless of the alternative selected, including the no federal action alternative, the impact of this planned land conversion is that certain agriculturally productive areas will be removed from the economic base of the County while other lands are converted to agricultural usage. By encouraging urban development to stay within a defined boundary, the provision and cost of providing urban services to an expanding population becomes somewhat more manageable for County government and agricultural land uses are promoted in the Rural Service Area where development pressure is reduced.

All of the alternatives being considered potentially could have the secondary impact of shifting or inducing growth within the established service area, with the exception of the Sand Lake Road Service Area/Interceptor Alternative. This relates specifically to the interceptor corridors at the northern end of Pine Hills Road, north to Beggs Road. This corridor is common to all interceptor alternatives in this portion of the sewer service area. Interceptor improvements in the Sand Lake Service Area involve interceptor and pump station upgrading only and, therefore, would encourage in-filling of existing developed areas rather than encouraging new development areas.

It should be noted that any shifting of population and induced growth levels into areas are not anticipated to exceed recommendations outlined in the GMP. At most, areas presently without central sewer service would be opened for new development at potentially greater densities and intensities. It can be expected that routes adjacent to vacant land with lower raw land values along the urban fringe will become more attractive to development. But development of these areas is more a function of market timing, location and the availability of all required urban services, than the potential access to a sewer interceptor alone. The planned phasing of interceptor improvements will effectively mitigate these impacts.

Each of the alternatives utilizing the northwest subregional plant site, which would be located outside the Urban Service Area, has a potential for significant secondary impacts by inducing growth outside the established service area. If development pressures were introduced due to the presence of a force main to the treatment facility, housing densities and population could increase, thus increasing the daily sewage load.

However, several factors would preclude these population impacts from occurring. The interceptors will be designed under the 201 Facilities Plan to accommodate the projected Year 2000 growth in the existing Urban Service Area. Also, interceptor lines and the proposed treatment will be constructed in staged increments. Therefore, any available capacity within the interceptor system will be short-lived until treated flows reach design flows. Moreover, each of the alternatives assumes only the Year 2000 urban area flows will be handled through the system configurations, not additional flows from rural areas converted to urban designation. Finally, it is questionable if the County would allow other urban services to be provided in this rural area, e.g. centralized water supply systems.

Construction of interceptor routes under any of the alternatives will have minor short-term impacts on adjacent land uses and economic activities such as disruption of traffic, and construction noise and dust. Commercial and industrial activities are also not expected to be significantly impacted by construction.

There are also benefits which would result from the selection of any of the service area/interceptor alternatives. For the most part, the proposed interceptor routes and service area configurations support the concepts and policies outlined in the County and City GMP's, in that expanded central sewer would be made available within the defined areas prescribed for future urban development. More intense urban development would be allowed to take place through "infilling", assuming related key urban services were also available. Intensive commercial/industrial development, which is a significant tax revenue producer, would benefit from the expanded sewer service. Finally, the accessibility to an expanded interceptor system would have a beneficial effect by providing the development market place with more viable options at mixed densities and intensities, since the inventory of vacant developable land with access to sewer service would increase.

Economy

Economic impacts for all service area/interceptor alternatives are closely related to the population and land use impacts mentioned above. Land conversion, resulting from the development of citrus groves within the Urban Service Area, causes productive agricultural areas to be removed from the economic base of the County. However, this negative impact is offset by the reduced costs of urban services and their becoming more manageable for County government because urban development is encouraged to stay within a defined boundary. In addition, intensive commercial and industrial development, which is a significant tax revenue producer, will benefit from the expanded sewer service.

Community Services and Facilities

Overall, construction and operation of any of the proposed interceptor routes would not impact community services and facilities. However, regardless of which alternative is selected, facilities and services would experience secondary impacts due to population growth that will be served by the sewer systems. Growth in service demands is not predicated on the availability of sewer service, but a result of a growing population base. All of the essential community facilities and services are affected by population shifts.

Archaeological and Historical Resources

In general, little is known about the prehistoric and early historic resources in the 201 Planning Area. When predicting the presence or absence of archaeological sites for the four service area/interceptor alternatives, assumptions were made with regard to the area proposed for construction. Where construction will occur in upland areas near lakes or other permanent freshwater sources, a moderate to high liklihood of impacting potentially significant cultural resources is assumed. In flatwoods environments having better drained, elevated land in association with a freshwater swamp or other seasonal water source, a low to moderate potential for sites can be predicted. In those areas where freshwater sources are lacking, regardless of the topography and vegetation, a low site expectancy can be posited.

The archaeological and historical background research for the evaluation of alternatives for the Southwest Orange County EIS was designed to evaluate impact, both primary and secondary, on known cultural resources, and to assess the potential for disturbing unknown, significant prehistoric or historic sites (i.e. sites considered to be potentially eligible for listing in the National Register of Historic Places) primarily through a literature review. This was accomplished in the following manner: 1) archaeological and historical information compiled for the EIS was systematically evaluated; 2) other, more recent cultural resource surveys in Orange County were reviewed; 3) personnel at the offices of the Florida State Historic Preservation Office in Tallahassee were contacted for additional data from the Florida Master Site File and information regarding specific impacts which might result from construction of the alternatives; 4) review of all pertinent planning documents provided details regarding the alternatives; 5) consultation with project engineers provided additional background information about the project; and 6) a "windshield" inspection of selected alternatives provided a firsthand look at some of the alternative sites.

The systematic evaluation of the alternatives indicated that no known archaeological or historical resources would be impacted.

Air Quality/Odor/Noise

Impacts due to interceptor construction were evaluated and found to be short-term and generally insignificant with respect to dust, emissions, odor and noise. Noise and odor impacts associated with the operation of pump stations and gravity sewers would be insignificant with proper pump selection and sewer design.

F.2 Wastewater Disposal

Potential impacts related to the wastewater disposal alternatives were identified for water resources, land resources, ecological resources, population, land use and economy, archaeological and historical resources, and air quality/odor/noise. These potential impacts are presented below for each category.

Water Resources

The evaluation of water resource impacts was based on the results of a preliminary screening analysis conducted for the 201 evaluation process, and should not be considered sufficiently accurate for the evaluation of specific alternatives. The analysis was useful, however, in order to compare the potential impacts of the alternatives.

Significant beneficial impacts (e.g. decreased eutrophication rate of Lake Tohopekaliga, increased aquifer recharge, etc.) would be expected to result from wastewater disposal depending on the specific alternative chosen. If any one of the proposed land disposal methods was selected (e.g., citrus irrigation, rapid infiltration, or groundwater conservation), the wastewater flow presently discharged to Shingle Creek would be reduced or terminated.

One of the potential impacts of most concern was the effect of effluent disposal on lake levels. Groundwater mounding caused by land application or the groundwater conservation alternatives could increase surface water elevations in the proximity of the areas of discharge. The degree to which surface water levels/flows would be affected depends upon the land disposal technique selected. Preliminary models were developed as part of the 201 planning effort to screen the alternatives and qualitatively compare the impact of the rapid infiltration, groundwater conservation and citrus irrigation alternatives on groundwater and lake levels. No increase in lake levels is expected to result from continued discharge to Shingle Creek.

Preliminary modeling efforts conducted for the 201 alternatives development and evaluation process were accomplished primarily to allow a comparative analysis of the alternatives. Simplifying assumptions (e.g. regarding leakage through subsurface confining layers and outflow from affected lakes to other surface water bodies) were used in this preliminary modeling effort due to the large areas of land involved and the lack of adequate site specific information. Therefore, specific numerical outputs of the preliminary modeling effort are presented below only for comparative, and not quantitative, evaluation.

Preliminary modeling of the alternative of using only rapid infiltration basins indicated significant lake level increases in landlocked lakes near RIB sites. Increases of the magnitude estimated would be expected to have a substantial impact on adjacent land uses. For 15 of the 33 lakes modeled, however, the projected increases were less than one foot. More detailed evaluation during operation and, possibly, adjustment of application rates would be required to assure acceptable levels of impact.

For the groundwater conservation disposal option, the analysis indicated a potential impact on 42 lakes. Of this total, 33 were projected to experience an increase of less than one foot. The maximum increase modeled was 2.2 feet. While it is anticipated that increases of such small magnitude would have no detrimental impact, each lake should be examined in detail to insure that proposed increases are acceptable.

For the citrus irrigation option, the model indicated a significant increase in lake levels within the citrus irrigation target areas, based on projected application rates of 26 to 72 inches per year. It is anticipated that judicious selection of irrigation sites, combined with appropriate application rates, would maintain lakes at acceptable levels. No significant impacts would be expected for lakes outside the irrigation target area. The same types of impacts and mitigative measures would be expected for the combined citrus irrigation/rapid infiltration, on-lot, and no federal action alternatives.

The principal concern with respect to surface water quality was the potential for the wastewater disposal methods to result in increased nutrient loadings to area lakes via groundwater flow. These nutrient loadings could accelerate the eutrophication of these lakes. A preliminary analysis of selected area lakes indicated a potential for rapid infiltration to produce detrimental impacts on surface waters by increasing the nutrient loadings. Groundwater monitoring, as required by FDER, would be performed quarterly throughout the operation of the proposed rapid infiltration basins. Surface water monitoring of potentially affected lakes would also be accomplished periodically to detect any adverse impacts to lake water quality. This would ensure that if nutrient removal rates were not adequate, corrective action could be taken before significant adverse impacts occurred to adjacent surface waters.

The reclaimed wastewaters entering the water table and upper Floridan aquifers for the groundwater conservation and citrus irrigation options would be of very high quality and should have no significant detrimental impact on lake quality. This is because of the high level of treatment required for the groundwater conservation program. Also, citrus irrigation will allow nutrient uptake by the trees and reduce the fertilizer requirements for the irrigated groves. It is possible, however, that increases in groundwater table levels could decrease the amount of rainfall infiltrating into the groundwater system and thereby increase surface runoff rates as a result of implementation of the groundwater conservation alternative. This could result in an increase in sediment and nutrient loadings to surface waters. Care in recharge site location and design could minimize this impact.

The combined citrus irrigation/rapid infiltration alternative calls for reduced flows to both the rapid infiltration and citrus irrigation disposal sites, as compared with the individual alternatives. For the citrus irrigation portion of the combined alternative, the level of impact on surface water would be expected to be similar to that of the citrus irrigation alternative, although the reduced area requirement would probably allow use of only the more desirable irrigation sites, or diversion to the rapid infiltration basins. Selection of rapid infiltration basin sites which are remote from lakes would substantially decrease the potential negative impacts on surface water quality, and could eliminate those impacts entirely.

The alternatives involving continued discharge to Shingle Creek would require high levels of treatment to avoid adverse effects on surface water quality. Both Shingle Creek and Lake Tohopekaliga currently demonstrate significant quality degradation, attibutable in part to existing wastewater discharges. Two alternative treatment approaches were developed which might allow continued discharge with acceptable water quality impacts. These approaches were developed for cost comparison and funding eligibility purposes only, as Orange County and the City of Orlando have agreed to adopt the "no discharge" approach.

The alternative treatment levels for the continued discharge alternative are total phosphorus removal to 0.2 mg/l, or total phosphorus removal to 0.2 mg/l combined with total nitrogen removal to 3.0 mg/l. Phosphorus reduction to Lake Tohopekaliga would equal approximately 46 percent of the present rate, or about 3 percent less than the zero discharge option. Removal of both phosphorus and nitrogen would reduce the total nitrogen loading by about 15 percent, as compared with about 21 percent removal for zero discharge. Evaluation and implementation of a non-point source control strategy would be required to provide additional protection of water quality in Lake Tohopekaliga.

A significant degree of groundwater mounding would be expected to be associated with each of the proposed disposal alternatives with the exception of discharge to Shingle Creek. The groundwater conservation alternative would have the greatest effect on present groundwater conditions. This alternative would involve the injection of highly treated wastewater into the upper zone of the Floridan aquifer, creating a "bubble" of water lying above the less permeable layer separating the upper and lower zones of the Floridan aquifer. This bubble would spread out within the zone, recharging the aquifer, and forcing waters within the zone to move laterally away from the injection site and, to some extent, downward into the lower zone of the Floridan aquifer. The hydrostatic pressure produced near the injection point would probably also result in two other effects: (1) an increase in the elevation of the upper surface of the saturated zone in the water table aquifer, resulting in a reduction in depth from the ground surface to the water table; and (2) an increase in the rate of "leakage" from the upper zone to the lower zone across the confining layer which separates the two zones.

Design criteria for the groundwater conservation alternative provide for a maximum increase of 12 feet in the surface water table elevation. Analyses performed for the proposed design indicate that an increase of 12 feet near the recharge sites would result in a water table increase of about 3.7 feet at a distance of 5,000 feet from the site, and the water table impact would cease to be noticeable at a distance of about 10,000 feet. While some impact on development compatability and property values could result in the immediate vicinity of the recharge sites, appropriate design of recharge systems and site selection should minimize any detrimental influences.

The initial groundwater mounding analysis in the 201 Facilities Plan predicted significant increases in groundwater levels for the land application alternatives. Predictions of increases in groundwater levels for the citrus irrigation program were significant, but of a lesser extent than rapid infiltration.

The combined citrus irrigation/rapid infiltration, on-lot and no federal action alternatives would use application rates similar to the rapid infiltration and citrus irrigation alternatives, resulting in similar magnitudes of groundwater mounding. The lesser flow rates associated with each disposal method for the combined, on-lot and no federal action alternatives would reduce land requirements for each method and lead to a reduction in the areal extent of impact. Additionally, it is likely that because less land is required for each disposal method, only well-suited sites would be selected.

Based on the information available concerning the alternative disposal methods, there would be a potential for extensive groundwater mounding due to the land application alternatives with the attendant negative impacts on property values, lake levels and surface water quality. However, consideration of groundwater mounding effects in system design criteria could effectively mitigate any potential adverse impacts.

Beneficial impacts of increased recharge and potentiometric levels of the Floridan aquifer are expected with the rapid infiltration, citrus irrigation, groundwater conservation, combined citrus irrigation/rapid infiltration, on-lot and no federal action alternatives. This would help maintain existing potentiometric levels and protect the water supply aquifer against salt water intrusion. No significant adverse environmental impacts are anticipated with these increases.

Prior to implementation of any land application option in the Planning Area, assurance of adequate quality protection is essential. This is because groundwater is the source of the area's potable water supply. The groundwater conservation, citrus irrigation and rapid infiltration basin alternatives require specific levels of treatment in order to safeguard groundwater quality. Advanced wastewater treatment to produce an effluent which meets primary and secondary drinking water standards is required for the groundwater conservation alternative. The resulting quality of reclaimed wastewater is expected to be similar to that of the ambient groundwater, and may result in a slight improvement in quality with respect to some constituents in the upper zone of the Floridan aquifer. Treatment levels required for citrus irrigation and rapid infiltration are identical and involve secondary treatment followed by filtration and high level disinfection. Additional treatment of the applied effluent would be provided in the soil matrix. The extent of additional renovation would be expected to be greater with citrus irrigation than rapid infiltration basins due to the application rates involved. Primary and secondary drinking water standards would be met by both of the land application options. No significant impacts to groundwater quality are expected from implementation of these alternatives.

The projected impacts of the combined citrus irrigation/rapid infiltration alternative would be the same as those given above for the individual disposal techniques. There were no significant impacts with respect to groundwater quality expected to result from the continued discharge to Shingle Creek option.

Land Resources

Potential impacts on land resources are related to construction and operation activities of the proposed transmission line and effluent disposal methods. These impacts include land reshaping, soil erosion and sinkhole formation. Soil erosion is the only potential impact common to all the alternatives, and is not anticipated to be of a significant nature. Land reshaping and sinkhole development is not of concern with respect to the transmission systems. The following alternatives would involve land reshaping: rapid infiltration, citrus irrigation, combined citrus irrigation/rapid infiltration and no federal action. The groundwater conservation and surface water discharge alternatives would not alter the topography significantly and are not considered further.

The citrus irrigation alternative would require the construction of a reserve storage reservoir to serve as a backup for the distribution system requirements. Construction of the reserve storage reservoir would impact the topography only slightly because the embankment necessary to fulfill the storage requirements would be relatively low in height. The maximum length of the embankment would be slightly under 5,000 feet, corresponding to the largest reservoir size. Drainage patterns and recharge in the vicinity of the reservoir should not be altered significantly.

Land reshaping would be required for construction of rapid infiltration basins. However, rapid infiltration basins would utilize a small percentage of the sites and would have little or no impact on drainage patterns. Similarly, the combined rapid infiltration/citrus irrigation alternative, including the no federal action alternative, would have a similar impact on the land resources. The difference would consist in the land area affected by rapid infiltration basins, and the fact that a reserve storage reservoir would not be necessary for the citrus irrigation portion of the combined alternative. Therefore, the only land resources impact relating to land reshaping would be from the rapid infiltration portion of the combined alternative.

The potential for development of sinkholes would be increased by all of the land treatment alternatives considered except the citrus irrigation option. Rapid infiltration, including the combined alternative and no federal action alternative, would increase the downward flow of groundwater, which can transport sediment from the unconsolidated strata into voids which are present in the limestone/dolomite strata. The groundwater conservation alternative would enhance sinkhole development because reclaimed wastewater would be injected directly into the carbonate rocks. Dissolution of the lime rock would occur, causing the enlargement of existing caverns.

It should be noted that the development of sinkholes in the rural areas associated with the rapid infiltration scenarios would most likely not cause severe damage. This is primarily because most of the lands are open space or agricultural. However, the groundwater injection sites would be nearer to urban areas and could cause more severe damage. Predictive studies, such as lineament studies, borings, and surface geophysical methods, could be conducted on the alternative sites to avoid location of disposal fields in the vicinity of high sinkhole risk areas.

Secondary impacts on the local environment related to the land resources of the area would be limited to the visual aspects of effluent disposal for the proposed alternatives. From this visual perspective, the rapid infiltration alternative could affect the greatest quantity of land with a total site area of over 4,000 acres. However, as the wetted area would be only 1,000 acres, landscaping could reduce the potential impacts related to the appearance of the sites after the basins are constructed. Therefore, no significant secondary impacts on land resources would be anticipated.

Ecological Resources

The primary impacts evaluated with respect to ecological resources relate to: (1) removal of vegetation for construction of the proposed facilities and development to be accommodated by the project; and (2) the potential impacts on ecological resources due to operation of the alternatives. Construction related ecological impacts were determined to be insignificant. Operational concerns are related to the impacts of increased lake levels and nutrient impacts on aquatic and wetland communities.

The impact assessment of the effluent disposal alternatives found that, in general, they would have little or no significant impact on the plant and animal communities. The rapid infiltration basins are an exception in that they could significantly increase the water level of nearby lakes. Lake level increases could cause permanent changes in the aquatic ecosystem and adjoining wetlands. These changes are not necessarily detrimental to ecological resources. Over a period of several years, the aquatic ecosystem would gradually change and approach a normal lake ecosystem. If the topography around the lake is appropriate, new wetlands may eventually form to replace those that were inundated.

The combined rapid infiltration/citrus irrigation, no federal action, and on-lot disposal alternatives would increase the variation in the natural annual cycle of lake levels. The cyclic changes in water levels could prohibit the development of new rooted aquatic vegetation or wetlands. If this were to occur, members of the animal community and fish could be reduced due to the reduction in aquatic vegetation.

Population, Land Use and Economy

With respect to the transmission corridors for each of the disposal options, no adverse land use impacts beyond the construction stage would be anticipated. The construction of the transmission alternatives, as well as the treatment and disposal alternatives, would not cause long term impacts on residents or land use activities. Temporary inconvenience due to dust, noise and altered travel patterns will occur, but will not be of a significant nature. Unlike the proposed interceptor routes which collect raw wastewater, transmission lines penetrating into the rural service areas of Orange County cannot be accessed for sewer service by nearby development. The transmission lines transport only treated wastewater.

There would not be relocation impacts for the citrus irrigation, groundwater conservation and no federal action alternatives. Furthermore, no residents or businesses would be significantly impacted or relocated by transmission line construction under any of the alternatives proposed. For the rapid infiltration basin alternatives, no significant relocation impacts should be encountered due to the types of land use activities present on the proposed sites. The size of the individual sites would allow flexibility in determining the specific basin locations. Most of the sites would not experience direct urban development pressure during the 201 Facilities Planning period, with the exception of those located within the urbanizing corridor between Silver Star Road and Old Winter Garden Road. Urban development continues to push west toward Winter Garden/Ocoee through this Urban Service Area corridor. These sites could be completely surrounded by urban development by the Year 2000. This could lead to long term problems for development on the peripheral areas of these sites due to increased water tables and lake levels resulting from RIB operations.

Construction and operation of RIBs adjacent to developed or developing areas could impact property values of these adjacent properties. Site design should consider the visual perception of the sites and individual basins. Due to the level of preapplication treatment to be provided, odor impacts are not anticipated to be a potential problem for adjacent land uses. Impacts from induced growth and population shifts would not be expected for any of the transmission, treatment and disposal alternatives.

Expected lake level increases associated with the groundwater conservation and land disposal alternatives would have both beneficial and negative impacts. Although no significant land use changes would be anticipated, such as widespread flooding of residential structures, lake level increases could benefit property owners by increasing the lakes' recreational value and, therefore, the property values along shorelines. Negative impacts due to increased lake levels could include property damage from inundation.

The possibility also exists for increased groundwater tables in and around many of the rapid infiltration sites, potentially leading to premature failure of existing septic systems installed adjacent to the disposal areas. Of the no discharge alternatives, the citrus irrigation and combined citrus irrigation/rapid infiltration basin alternatives would have the least impact on land use.

An important consideration with respect to the citrus irrigation, rapid infiltration and combined citrus irrigation/rapid infiltration disposal alternatives involves the potential impacts on agriculturally unique areas in western Orange County. An estimated 19,000 acres of citrus groves could be irrigated within the target areas being considered at the projected Year 2000 flow rate. This would be a beneficial impact due to the increased productivity of the groves and reduced fertilizer requirements. There will be no appreciable impacts to citrus groves with the Shingle Creek discharge and groundwater conservation alternatives.

Alternatives involving rapid infiltration would utilize approximately 1,065 acres of wetted area for disposal. Existing areas of citrus groves are located within each of the rapid infiltration basin sites. The exact amount of citrus acreage that would be affected was not determined because the boundaries of the individual basins were not provided in the alternatives description. However, it is known that not all of the rapid infiltration basin sites are in agriculturally unique areas.

Therefore, the net impact of removing portions of these citrus groves to accommodate the basins would be negligible. Also, none of these basins will be in areas that are now active groves.

Alternatives involving citrus irrigation could beneficially affect as many as 19,000 acres of citrus groves. Utilization of these areas for citrus irrigation disposal would have an overall beneficial effect for growers and for Orange County. Through the use of this disposal method, citrus productivity should increase within the groves, and the potential exists for reducing costs for production of citrus fruit. Agriculturally based pursuits would be encouraged to continue, and these private properties would remain on the County's tax rolls. Moreover, continued private agricultural use and reduced irrigation and freeze protection costs for these citrus areas would serve to provide the County an important open space/greenbelt area consistent with the goals of the County's GMP. Finally, the use of this disposal method would reduce the overall land acquisition costs associated with the 201 Program for disposal of effluent.

Alternatives involving a combined disposal approach with rapid infiltration and citrus irrigation would affect an unknown amount of agriculturally unique land. The combined approach was developed to provide for the disposal of the excess renovated effluent not irrigated on citrus. The rapid infiltration component would utilize an estimated 464 acres of wetted area. The actual amount of citrus area to be used for basin construction cannot be determined because the actual basin boundaries were not provided. The remaining land would be used for citrus irrigation, and the impacts would be similar to those described previously for the citrus irrigation alternative.

In summary, some trade-offs exist within the disposal components with respect to unique agricultural lands. Alternatives involving citrus irrigation would serve to enhance these areas and should provide an overall net beneficial effect for growers and the County. Utilization of disposal components involving rapid infiltration basins would, however, involve the removal from agricultural use of some of the County's unique agricultural land.

Archaeological and Historical Resources

The systematic evaluation of the alternatives, as described previously, indicated that no known archaeological or historical resources would be impacted.

Air Quality/Odor/Noise

There would be no significant odor problems associated with the alternatives employing citrus irrigation. Potential odor sources due to the rapid infiltration basin effluent disposal alternative and combinations using rapid infiltration basins include applied wastewater and deposited solids during the drying cycle; however, problems should be minimal if proper operation and maintenance are observed at both the wastewater treatment facility and the rapid infiltration site. Other factors which serve to mitigate any potential impacts include the high level of treatment to be provided and the presence of buffer zones. Noise related impacts were determined to be insignificant.

The potential for aersol formation from the disposal alternatives would be limited to areas near overhead sprinklers as may be used for the alternatives which include citrus irrigation. EPA data show that aerosol fecal coliform concentrations at slow rate land application facilities are less than those at activated sludge plants. Based on this and the high level of treatment and disinfection to be provided, neither facility employees nor people living near treatment facilities should be subjected to an increased risk of disease due to aerosols. High level of treatment and chlorine disinfection prior to rapid infiltration and citrus irrigation serve to minimize the potential for any health problems due to aerosol production.

Fog formation may be a potential problem caused by citrus irrigation and rapid infiltration basins. However, this would not result in a significant impact. Spray irrigation is a procedure that is already in use at many agricultural sites in the area. Rapid infiltration basin sites would cover a much smaller area than the 41,000 acres of existing Orange County lake surface. In addition, fog formation at the rapid infiltration basins would be further minimized by the use of buffer zones.

F.3 Wastewater Treatment Facilities

Potential impacts of concern with respect to the wastewater treatment alternatives are related to community services and facilities, archaeological and historical resources, and air quality/odor/noise.

No impacts on community services and facilities would occur as a result of the treatment facilities or locations. However, as stated previously, the combined capital, operation and maintenance costs of the wastewater management alternatives would have a major impact on the City and County wastewater program budgets.

The previously described systematic evaluation of the alternatives indicated that no known archaeological or historical resources would be impacted. Detailed field evaluations were recommended and later accomplished for the selected plan. These also indicated that no significant impact on archaeological or historical sites would result.

The potential for odors associated with the implementation of wastewater treatment facilities was a major concern. Many odor problems could be prevented by the inclusion of appropriate control facilities during design to control odors at the source. In general, flow velocities should be maintained such that deposition of solids does not occur, aeration facilities should be provided as appropriate, detention times should be carefully considered, and facilities encouraging good housekeeping should be provided. Other odor control techniques applicable to wastewater treatment facilities include the addition of chemicals such as chlorine, hydrogen peroxide, ozone, and lime; adsorption using activated carbon; chemical absorption or scrubbing; and dispersion or dilution to reduce malodors below threshold levels.

Noise impacts generated during construction are due primarily to the operation of major equipment, such as earth moving equipment and material handling equipment. Noise from stationary equipment is associated with the operation of the treatment facilities and includes that due to pumps, generators and blowers. The noise levels would not create a significant impact in the Planning Area. Noise control measures can be taken to minimize the noise of major equipment and system operation. In addition, the wastewater treatment plant sites are located in rural areas or are generally well buffered from developed areas.

The potential for aerosol formation would be limited to areas near the treatment facilities. Aerosols are a concern with respect to the spread of bacteria and viruses. Based on information presented in EPA Process Design Manual for Land Treatment of Municipal Wastewater (EPA 623/1-81-013), epidemiological studies indicate that there is no significant increase in the disease rates of populations adjacent to activated sludge facilities when compared with the general population.

F.4 Sludge Treatment/Disposal

Potential impacts of concern with respect to sludge treatment/disposal are similar to those of wastewater treatment alternatives. However, because anaerobic is proposed rather than aerobic digestion, existing and potential odor and aerosol problems should be minimal. The proposed sludge treatment/disposal processes are anticipated to reduce odor impacts at the existing treatment facility sites. No significant adverse impacts are anticipated due to the proposed sludge treatment/disposal alternatives.

F.5 On-Lot Treatment/Disposal

Potential impacts associated with the On-Lot treatment/disposal alternative are similar in nature to those of the combined citrus irrigation/rapid infiltration basin alternative. Because 2.3 million gallons per day of wastewater would receive treatment and disposal by on-lot septic tank systems, the flows treated and disposed of via citrus irrigation/rapid infiltration basins would be less. Therefore, the impacts associated with that portion of the On-Lot treatment/disposal alternative would be somewhat reduced.

Septic tank disposal could impact the water quality of some lakes. Both nitrogen and phosphorus may cause water quality impacts from high density septic tank usage in low and medium potential soils where the leachate could travel laterally to surface waters. Based on the results of that evaluation, the use of septic tanks at high densities in areas contributing subsurface flows to lakes could cause water quality degradation, and would need to be evaluated in more detail. This was the result of a preliminary evaluation and was not based on actual field data. It is anticipated that careful design, operation and regulation of septic tank disposal could minimize potential adverse impacts. Continued use of existing septic tanks in the 201 sewer service area at low densities would generally not be expected to result in significant impacts to major lakes and streams. The water quality of one small lake (Lake Floy) was anticipated to be potentially impacted by existing septic tanks within its drainage area. Detailed on-site evaluation of septic tank pollutant loadings is required to more precisely define the extent of water quality impacts.

F.6 No Federal Action

The potential impacts of the No Federal Action alternative are similar to the On-Lot treatment/disposal alternative. However, this alternative entails two additional subregional treatment facilities. Construction and operation of the Orangewood Subregional Facility could impact existing residential uses adjacent to the plant site if potential air quality/odor/noise problems are not properly controlled.

The Northwest Subregional Facility would be constructed in the Clarcona area of northwest Orange County in the Rural Service Area. Construction and operation of this facility and its associated interceptor system could result in unplanned development in that portion of the Rural Service Area, as well as the untimely development of the perimeter areas of the Urban Service Area. Disposal of the effluent from the Northwest Subregional Facility would occur in the vicinity of the plant site. Operation of the rapid infiltration basins proposed for subregional facility could also impact the operation of septic tanks in adjacent areas due to increases in water tables.

The No Federal Action alternative would utilize disposal through individual septic tanks in several residential areas, and use of the combined rapid infiltration/citrus irrigation option for centralized disposal. As discussed previously, use of the latter technique would not result in significant groundwater degradation. Use of septic tanks as proposed, however, may have a detrimental impact on groundwater quality in some locations where drain fields are located in excessively well-drained soils. While this problem represents a significant concern within the Planning Area, careful site selection and process design, combined with regulatory constraints, could minimize associated impacts.

Wastewater budgets and user charges for the City and County would be increased due to both construction and operation of the facilities required for this alternative. Increased construction costs to local governments would occur because no federal funds would be expended. Additional treatment facilities to serve the designated sewer service area would also increase the overall cost of operating and maintaining the required facilities. This would result due to an increase in required operations personnel and other costs of dispersed facilities rather than less numerous, more centralized facilities.

G. EVALUATION OF THE SELECTED PLAN

Selection of the recommended plan was accomplished based on cost, environmental impact, implementability and operability. This section summarizes the environmental impacts evaluation of the selected plan. Project refinements have been accomplished throughout the planning process to mitigate potential environmental impacts. Some of these are also incorporated into this section.

G.1 Surface Water Resources

Implementation of the selected plan will eliminate the direct discharge of effluent to Shingle Creek and should result in a decreased rate of eutrophication in Lake Tohopekaliga. While this accomplishes one of the primary objectives of the Southwest Orange County 201 Facilities Plan, the potential effects of the proposed action on other surface water resources were of concern and, therefore, evaluated.

Lake Levels

Lakes are the primary surface water resource of concern in the 201 Planning Area because they are natural resources of important economic and recreational value. They also serve as direct sources of recharge to the area's potable aquifers. The average annual elevation of lakes located near the proposed RIBs are expected to increase after RIB operation begins because of the additional recharge to the water table aquifer. This may result in relatively high lake levels during some unusually wet years. However, Orange County has adopted a policy which will prevent loading RIBs near lakes when those lakes approach their 100-year flood level. With the proposed operational procedures, wastewater would be diverted to citrus irrigation or to RIBs located further from lakes. Therefore, it is not anticipated that RIB operation will cause flooding of lands which would not have been flooded under existing conditions. Beneficial impacts will occur to Lakes Avalon, Ingram and Johns. These lakes have been at lower than normal elevations during recent years, and a rise in their levels should increase their recreational usefulness.

Lake Water Quality

The potential impact on the water quality of lakes in the region due to RIB operation is not expected to be significant. Five of the six lakes nearest to the RIB sites (Lakes Hancock, Hartley, Speer, Johns and Avalon) appear to be phosphorus limited. These lakes would be sensitive only to changes in phosphorus concentrations, and not to changes in nitrogen concentrations. Because an excess of nitrogen is available in these lakes, an increase in nitrogen levels would have no impact on the rate of vegetative growth. Lake Black is apparently not phosphorus limited, but may be light limited, and therefore, not sensitive to nutrient enrichment.

A comparison of water quality in lakes and the water table aquifer shows that the concentration of total nitrogen in the water table aquifer and in lakes is in the same approximate range. Most of the nitrogen entering lakes from the water table aquifer remains available in the water column for the growth of aquatic vegetation. An increase in the concentration of nitrogen in the water table aquifer could be expected to result in a nearly equal increase in nitrogen concentrations in lakes. A comparison of phosphorus concentrations indicates that the phosphorus concentration of the water table aquifer is about ten times that of lakes. It appears that most of the phosphorus entering lakes from the water table aquifer is rapidly consumed by algae and aquatic vegetation, and therefore, not measureable in lake waters. This further substantiates the assumption that the lakes are phosphorus limited.

As stated above, nitrogen enrichment is not anticipated to be a problem, even though nitrogen levels will increase above current levels. The concentration of phosphorus in the water table aquifer is not expected to increase as a result of RIB operation, and may possibly decrease due to the advanced secondary treatment of the wastewater. Because the phosphorus concentration of groundwaters reaching lakes is not expected to be increased, it is predicted that eutrophication of these lakes will not be accelerated and no significant deterioration of water quality is expected to occur.

Continuing surface water monitoring of Lakes Black, Hancock, Hartley, Avalon, Ingram, Johns and Speer will be accomplished by Orange County to identify any significant changes in water quality which might occur. Both shoreline and in-lake monitoring stations will be established at several points on all lakes in the vicinity of the RIB sites. Monitoring station locations will be fixed by an in-place water level staff gauge. In order to monitor the effect of RIB operation on lake water quality, a data base collected prior to construction of the RIBs will be used for information on background parameter levels. Monitoring stations on lakes upgradient of the RIB sites will provide additional background water quality data.

While FDER regulations do not specify the surface water quality parameters to be monitored, for consistency those parameters listed in the groundwater monitoring requirements will be measured along with some additional parameters that are particularly indicative of surface water quality. Initially, all parameters will be measured on a quarterly basis in order to quantify the seasonal variation in parameter values. Subsequent sampling frequency will be adjusted appropriately based upon initial results.

G.2 Groundwater Resources

Groundwater Levels

Groundwater movement in southwest Orange County is three-dimensional due to the hydraulic connection of the Floridan aquifer and the water table aquifer. A three-dimensional USGS model was utilized in developing the 201 Facilities Plan to predict the mounding anticipated to occur with the initiation and continued operation of wastewater disposal operations at the proposed RIB sites. From the results of this model, it was estimated that only a slight rise will occur in the potentiometric surface of the Floridan aquifer. A rise of a few feet in the potentiometric surface is not considered a significant impact.

The elevation of the surficial aquifer, which consists of the upper soils of the region, will be increased in some areas as compared to its normal level, due to RIB operations. The maximum elevation of the water table will be closer to the land surface beneath the RIB sites and in the immediately adjacent areas. In addition, it is expected that the elevation of the water table will vary more frequently and more rapidly as a result of RIB operation. However, based upon hydrogeologic mathematical models prepared for the area, it is not expected that the shallower water table created will significantly affect existing agricultural activities or other land uses on properties adjacent to the RIB sites.

Groundwater monitoring will be conducted to record changes in groundwater levels and help prevent any potentially adverse impacts that might occur due to groundwater mounding. Excessive groundwater mounding could cause increased surface runoff rates, septic tank malfunctions and property flooding. Mitigative measures involve adjusting RIB application rates or utilizing alternate RIBs. A computerized management system called the "On-Going Management Tool" will be used in conjunction with disposal control systems to allow for operational modifications based on monitoring and flow control data.

Groundwater Quality

Minor changes in the quality of groundwaters in the areas may occur due to RIB operation, but are generally not expected to be significant. For example, the average concentration of some chemical constituents, such as nitrogen, may be increased in the groundwaters near the RIB sites. However, no significant impacts on the quality of these waters is anticipated because these constituents are expected to meet water quality standards at the site boundaries. Based on data obtained during the 201 Planning studies, the treated wastewater effluents from the Sand Lake Road and McLeod Road treatment plants presently meet all primary and secondary drinking water standards except for coliforms, turbidity and iron. In addition, both the City and County have developed industrial pretreatment programs to monitor and control the discharge of industrial wastes into the sanitary sewer systems.

The concentration of nitrogen in the groundwaters directly below RIBs may increase to levels somewhat above those allowed for drinking water. However, it is anticipated that mixing with other groundwaters and percolating rainwater will occur and reduce these concentrations to a level which will meet drinking water standards. RIB Site 5 will be used for testing operational procedures to control nitrate-nitrogen levels in the groundwater.

A continuous monitoring program, as required by the FDER, will be implemented to assure that the quality and elevation of the groundwater are not significantly affected by the project. If adverse impacts to the groundwater occur, further impacts could then be avoided by reducing the RIB loading rates or changing operational procedures.

The groundwater monitoring program has been designed to assess the impact of the hydraulic loading of individual Rapid Infiltration Basins (RIBs) on the surficial and Floridan aquifer systems. The monitoring well network will be constructed prior to the start of construction of the RIBs and will be designed to measure water elevation and water quality changes within each RIB site. Background water quality and water elevation data will be monitored during the RIB construction period and prior to the start of hydraulic loading of each RIB site. Background data will be monitored in a series of surficial and deep monitoring wells. Following the start of operations at each site, background water quality data will continue to be monitored hydraulically upgradient from the area of disposal at each site.

Additional monitoring wells will be provided along a boundary which is defined by the zone of discharge around the periphery of each RIB site and at several other interim points within the zone of discharge. The zone of discharge for each RIB "site" as defined by Chapter 17-4 of the Florida Administrative Code (F.A.C.) is defined by a line which is located 100 feet outside the outermost boundary of the individual RIBs within each area (e.g., Sites 5, 6, 7 and 9).

The primary monitoring system for each RIB site is comprised of a network of shallow monitoring wells within the upper surficial aquifer. Individual wells are located along the outer zone of discharge for each site in order to intercept the flow of effluent from individual RIBs to offsite areas and provide measurement of water quality impacts. The hydrogeology of the area indicates that both external, offsite drainage and internal on-site drainage is to be expected. Therefore, additional intermediate monitoring wells have been provided within the zone of discharge to monitor any anticipated drainage through topographically low depressional areas into the deeper Floridan aquifer system. This concept of the monitoring program recognizes that for internally drained sites, the zone of discharge must be defined in a vertical as well as horizontal orientation.

The impact of the hydraulic loading of individual RIBs on the surficial groundwater system is measured in both water quality and water elevation changes. In order to monitor the changes in water elevation and to provide essential data to control the operation and loading of individual cells throughout each property, additional 2-inch monitoring wells have been provided within each RIB site. In general, these wells are located along potentiometric ridge lines and will be used to measure the change in water table elevation which has a direct bearing on operational decisions. Several low lying depressional areas are found within each RIB site, many of which contain water year-round. In order to monitor the change in surface water elevation, staff gages will be provided within the predominant depressional areas. The staff gages will be used to measure water elevation changes and to provide input to operational decisions regarding the loading of individual cells.

Although the Floridan aquifer is considered to be outside the zone of discharge for each RIB site, as defined under Section 17-4 F.A.C., monitoring wells in the Floridan aquifer will be provided to measure water quality and water level changes. Existing wells in the Floridan aquifer at Sites 5, 6 and 7 will be used for measurement of water quality and water level changes. A new 4-inch diameter monitoring well will be constructed hydraulically downgradient from Site 9, also to measure water level and water quality changes. In addition, existing wells within the Floridan aquifer upgradient from Site 9 and downgradient of Site 6 will be monitored on a regular basis to detect any water quality changes at a regional scale.

Groundwater monitoring is not planned in the citrus irrigation areas. Based on an agreement with FDER, the quality of the water leaving the distribution center site will be monitored for pH, fecal coliform and chlorine residual. However, if groundwater monitoring at the RIB sites indicate water quality degradation, monitoring in the citrus irrigation sites will be initiated. This strategy is based on the fact that if there are not problems at the RIB sites, where the loadings are greatest, then there should be no problems in the citrus irrigation areas, where loadings are minimal.

The University of Florida Institute of Food and Agricultural Sciences (IFAS) will conduct a monitoring program to determine the impacts of the irrigation on citrus production. This program will include an evaluation of the chemical characteristics of the citrus leaves, fruit and soil during irrigation. Water quality will be monitored at the point of application to the citrus groves.

G.3 Land Resources

The environmental assessment of the proposed construction and operation of the wastewater transmission, treatment and disposal facilities involved three aspects of land resources, i.e. topography, soils, and geology. Only one impact was determined to be potentially significant. This concerned the potential for causing or increasing the likelihood of the formation of sinkholes.

Evaluations of Sites 5, 6, 7 and 9 show the greatest potential for sinkhole formation at Site 6. The geology of Site 6 contains variable overburden thickness, Hawthorn thickness and Hawthorn competency (competency of the Hawthorn Formation is based on the number of blows per foot of a penetrating drill). Site 6 contains a number of remnant sinkholes, and small and large enclosed depressions. Groundwater modeling indicates that the water table beneath the site will be raised by about 30 percent above normal levels, causing an increase in the head differential with the confined aquifer and an increase in the load on the subsurface strata. However, if a sinkhole should develop, it is not expected to create a significant impact. Most of the past sinkhole activity associated with Site 6 has occurred in the extreme eastern portion of the site, where the nearest residents are greater than one-half mile from active disposal sites. If a sinkhole should occur in a basin during an application cycle, a relatively small volume of water could enter the aquifer directly. However, because of the high quality of the treated effluent, no significant impacts on groundwater quality would be expected.

G.4 Ecological Resources

Ecological field surveys were conducted to determine the impacts which might occur due to construction and operation of the proposed wastewater treatment, transmission and disposal systems. These field surveys identified the major plant and animal communities, as well as the presence or absence of rare, endangered or threatened species in the affected area. Based on evaluations of the findings, no threatened or endangered species will be affected, and it is anticipated that no long-term significant ecological consequences pertaining to construction or operation will result.

The gopher tortoise, a species of special concern, may be temporarily affected during construction in that the burrows of a few individuals are located in the vicinity of the proposed transmission corridor. Relocation of these individuals may be necessary if the construction affects their burrows. Various types of natural vegetation may be removed or disturbed during construction of the transmission system. The areas disturbed can be replanted with the appropriate species, to minimize the extent of the impacts.

The operational impacts associated with groundwater and lake elevation changes may also cause a short-term ecosystem adjustment. This is not necessarily an adverse impact, as the changes will gradually occur over a long period of time. In addition, the plant and animal communities will be able to adapt to the water level changes. The water level changes are generally expected to be less than two feet and are not expected to alter the seasonality of the present water fluctuations. The operational flexibility of the preferred alternative will also permit the avoidance of changed water level patterns, should they subsequently threaten to cause ecological impacts.

Mitigation of construction impacts involves minimizing the duration and total area of disturbance. The following specific suggestions were provided for mitigation: (1) minimize the destruction of plant and animal communities as much as possible; (2) revegetate disturbed areas quickly to avoid erosion and minimize disturbance of native species; (3) identify the presence of gopher tortoise burrows and attempt to relocate any individuals encountered in the construction zone to a habitat similar to that from which they were removed; and (4) enhance wildlife habitat adjacent to RIBs by selecting and planting vegetation recognized as beneficial for food and cover for wildlife. Revegetation of disturbed areas along the transmission corridor and at the RIB sites can be accomplished at little cost to provide the habitat requirements for wildlife.

An increase in lake levels could result during operation of the RIBs and affect the existing natural vegetative areas. Monitoring, as described above, followed by adjustments in the design and/or operation of the RIB system, should prevent any significant permanent destruction of shore-line vegetation. Other mitigative measures involve efforts to: (1) avoid a permanent increase in water level of greater than 2.5 feet above the historical and natural pattern of water level variations; (2) schedule maximum increases of water level for early winter when the ecological effects are minimal; (3) avoid prolonged water level increases in the spring, March through June, to encourage germination and protection of seedlings; (4) maintain the relative pattern of seasonality in water level changes which is required for the diversity of the wetlands; and (5) monitor vegetation growth patterns annually to avoid significant increases in aquatic weeds such as water hyacinth.

The ecological impacts resulting from groundwater mounding can be partially mitigated by controlling the timing and duration of the increases. If the duration of the increases is short (a few weeks), then effects on vegetation will not be permanent. The impacts on burrowing animals can be reduced if the groundwater level does not rise during periods of extremely hot and cold temperatures. The groundwater levels should also be controlled during the early spring growing seasons to avoid adversely affecting young plants. For citrus, the groundwater level should be controlled as much as possible and not be allowed to rise during very dry periods.

G.5 Population and Land Use

The proposed project conforms to existing and planned land uses and supports the goals and objectives of the Orange County and City of Orlando Growth Management Policies (GMPs). Although specific segments of the proposed interceptor system could cause induced growth, the planned phasing of the system should be adequate to control this potential growth. In addition, should induced growth occur, it would have to conform with the recommended densities of the adopted GMP. Therefore, no significant adverse impacts related to conformance with existing or planned land uses are anticipated as a result of implementation of the proposed project.

During construction and operation of the selected plan, disruption of existing land uses is anticipated to be the most prevalent type of potential impact to occur. Normal short-term construction-related impacts such as disruption of traffic patterns, temporary access problems, and construction traffic, dust and noise will occur during construction of the project. These temporary impacts along segments of the interceptor and transmission systems are unavoidable, may be mitigated to some extent, and are not anticipated to be of over-riding significance. With respect to interceptors, the impacts are considered to be necessary in order to avoid other potentially more significant secondary growth impacts which could occur if constructed in undeveloped areas.

Although the RIBs are located in areas of predominately agricultural or vacant lands, some impacts of existing land uses could occur. Disruption of an existing poultry farm adjacent to RIB Site 7 could occur due to construction or operation of the project. Project planning has included several modifications to reduce impacts to residents adjacent to RIB Site 6. Construction activities at the RIB sites are not anticipated to be significant. There are approximately 700 acres of active citrus groves on the RIB sites. Approximately 100 acres of active citrus will remain on the RIB sites after construction and will be leased for citrus management.

Operation of the RIBs may increase area lake levels. Although this could be a significant beneficial impact to some of these lakes, existing residential or agricultural areas could potentially be adversely impacted at specific lake levels. The effects of the project on water table and lake levels will be continually monitored by the County and City. The County has resolved to begin diverting wastewater to citrus irrigation or to other RIBs if lakes adjacent to operating RIBs come to within 18 inches of their 100-year flood level.

In order to evaluate the potential impacts of increased lake levels, land uses within the 100-year flood plain of lakes adjacent to the RIB sites were located using aerial photos and limited field checks. No potential impacts to existing land uses within the Lake Avalon 100-year flood plain are anticipated. Small areas of citrus groves could be impacted in the 100-year flood plain of Lakes Johns, Speer, Hartley, Hancock, and Ingram. Residential structures located within the 100-year flood plains of Lakes Black, Johns and Ingram could also be potentially impacted. The extent of the impact, even if the lake levels were to rise to the 100-year flood level, cannot be determined because the elevation of the floor of these structures is not known. This is not considered to be a potentially significant overriding impact because actual increases in lake levels cannot be adequately determined prior to operation due to variables such as the nature of potential citrus irrigation demand, weather conditions, and the actual hydrogeologic response of the RIB loadings. Also, the planned monitoring program combined with the operational flexibility of the proposed systems is expected to preclude significant impacts. More frequent monitoring of lake levels than the proposed quarterly readings may, however, be warranted.

The increase in groundwater levels due to RIB operation could adversely affect production of citrus in the affected areas. As mentioned previously, monitoring of groundwater levels and careful operation of the RIBs should prevent an increase in groundwater levels which might be detrimental to existing vegetation. A reforestation program will be implemented in order to mitigate impacts on land uses adjacent to the RIB sites. Construction impacts on the egg production at a poultry farm adjacent to RIB Site 7 can be reduced by not parking construction equipment near the farm and avoiding bright lights and loud noises.

G.6 Archaeological/Historical Resources

An archaeological and historical site survey and assessment was conducted in order to determine potential impacts of the selected alternative. As a result of this assessment, four previously unknown prehistoric sites were discovered. These sites represent short-term, special use camps or limited activity sites, and are relatively common in this and other archaeological regions. The sites are badly disturbed due to past planting and maintenance of citrus groves. It was determined that there are not significant prehistoric or historic sites eligible for inclusion in the National Register of Historic Places within the area designated for construction of the proposed project.

G.7 Air Quality/Odor/Noise

An analysis of the effects of the selected plan was undertaken to determine potential air quality, odor and noise impacts. Temporary, highly localized noise and dust impacts will occur due to construction, particularly in heavily developed areas along interceptor and transmission main routes. However, these impacts will cease after the construction phase, and will not create any long-term problems. Odor problems currently occur at the existing facilities, particularly at the treatment facilities, and design improvements are being made to reduce this impact. Upgrading of the facilities should reduce existing odor problems and, therefore, result in a positive impact. There are no significant adverse impacts anticipated related to air quality, odor or noise.

G.8 Summary

The mitigative measures described above will effectively reduce or eliminate potential adverse impacts associated with the selected plan. The selected plan thus meets the requirements set forth by FDER and U.S. EPA by eliminating effluent discharge to Shingle Creek, while implementing in its place a cost-effective, environmentally sound wastewater management program. In addition, the following grant condition is being placed on the proposed rapid infiltration basin facilities.

"If operation of the rapid infiltration basin system is shown to cause unreasonable adverse impacts, such as property flooding or damage, crop flooding or damage, adverse water quality impacts to area lakes, significant impacts to the area's groundwater quality or adverse impacts from groundwater level rises, the following mitigative measures shall be considered and the most appropriate ones taken by the County or other operators of the grant-funded facilities to correct the problem:

1. Reduction in loading to specific basin sites.
2. Relocation of specific basin sites.
3. Expansion of the acreage of the basin sites.
4. Additional basin sites.
5. Increase use of irrigation operation.
6. Increase level of treatment prior to infiltration.

These measures have been found appropriate by the Environmental Impact Statement to minimize potentially significant adverse impacts. The condition will be in effect throughout the life of the project."

CHAPTER IV

REVISIONS TO THE DRAFT EIS

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There were only minor editorial revisions made to the Draft Environmental Impact Statement.

CHAPTER V

EIS COORDINATION

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A. Introduction

The purpose of this chapter is to document the interactions and communications which occurred during the preparation of this 201 and EIS between local, state and federal agencies, their consultants, and affected members of the local community. Various methods were utilized in order to present the 201 and EIS findings and solicit comments from the groups involved. These methods included meetings, public hearings, newletters, news releases and the formation of a 201 Technical Advisory Committee and Citizen's Review Group for the EIS.

B. Coordination with Local, State and Federal Agencies and Organizations

Throughout the 201 and piggy-back EIS process, many agencies were involved directly or indirectly in the development and review of work products. The comments and/or concerns of these agencies have been incorporated into the Draft EIS. Table V-1 lists the agencies involved. Close coordination between all parties involved throughout the preparation of the 201 and EIS resulted in the development of a selected plan which is environmentally sound and acceptable to the general and affected public.

C. Public Participation Program

Public participation programs are mandated by federal regulations for the preparation of both 201 Facilities Plans and Environmental Impact Statements. A public participation program was implemented during the preparation of the Environmental Impact Statement for the Southwest Orange County 201 Facilities Plan. The purpose of the program is to provide an opportunity for public input and review throughout the preparation of the EIS. The program was a combined effort of EPA, Orange County and the EIS consultant.

A public meeting was held October 30, 1978 at the Windermere Elementary School in the Town of Windermere, Florida. The meeting had several purposes including informing the public about the 201 and piggy-back EIS, the further definition of the scope of the study and the solicitation of public input concerning the major study issues. Major issues raised at the meeting concerned the effects of providing centralized wastewater facilities in rural areas of the county and the need to conserve the water resources of the area.

The Southwest Orange County 201 Facilities planning effort included the participation of a Technical Advisory Committee (TAC). The TAC provided input regarding overall project policy decision making, coordination and technical review. The membership of the 201 TAC is provided in Table V-2.

TABLE V-1

AGENCY COORDINATION LIST

STATE OF FLORIDA

Florida Department of Environmental Regulation
Florida Game and Freshwater Fish Commission
Office of the Governor, Intergovernmental Coordination
State of Florida Department of Natural Resources
Florida Department of Administration, Division of State Planning
Department of State, Division of Archives, History and Records Management
Florida Department of Agriculture and Consumer Services, Division of Forestry
Florida Public Service Commission
Florida Department of Transportation
Florida Department of Commerce
Florida Department of Health and Rehabilitation Services

UNITED STATES GOVERNMENT

Environmental Protection Agency, Region IV
Environmental Protection Agency, Headquarters' AT Task Force
Department of Agriculture, Soil Conservation Service
Department of the Interior, Geological Survey
Army Corps of Engineers

LOCAL ENTITIES/AGENCIES

Orange County
City of Orlando
City of Edgewood
City of Belle Isle
City of Winter Park
City of Winter Garden
Town of Windermere
East Central Florida Regional Planning Council
South Florida Water Management District
Southwest Florida Water Management District

TABLE V-2

201 TECHNICAL ADVISORY COMMITTEE

MEMBER	REPRESENTING
Mr. Gabe L. Delneky, P.E. Chief Engineer	Orange County Public Utilities, Orange County
Mr. Howard W. Jewett, P.E. Superintendent	Wastewater Department, City of Orlando
Honorable Mauro C. Rigante	City Council, City of Belle Isle
Mr. Harry Rodis Assistant Subdistrict Chief	U.S. Dept.of the Interior, Geological Survey - Orlando
Mr. Donald J. Babair	Town of Windermere
Mr. Richard F. Hoffman District Conservationist,S.C.S.	City of Orlando
Mr. Lee Miller	St. Johns River District, FDER Orlando
Mr. Vince Williams	Division of Fisheries, Game and Fresh Water Fish Commission - Kissimmee
Mr. David Peacock, Chief	Florida/M.S. Facility Planning Section, EPA, Region IV - Atlanta

As part of the EIS program, a Citizen's Review Group (CRG) was formed to provide an opportunity for public involvement in the 201/EIS process. Members of the CRG represented a cross-section of community interests and are listed in Table V-3. The CRG was the focal point of the public participation program. The objective of the CRG was to ensure that the views and comments of various interest groups and concerned individuals were considered during the evaluation of environmental impacts/concerns. The CRG provided citizens with an opportunity to assist in identifying impacts or concerns associated with the alternatives considered in the 201 process. All comments and suggestions by the CRG were given full consideration in the development of the EIS.

The initial meeting of CRG was held August 26, 1980 at 7:00 PM in the Orange County Courthouse, Orlando, Florida. Review of the EIS plan of study, public participation plans and status of the 201 planning effort was accomplished at this meeting. The purpose of the CRG and the role of EPA in the 201 and EIS process was also explained at the meeting. All subsequent CRG meetings were also held at the Orange County Courthouse.

The second meeting of the CRG was held April 30, 1981 at 7:00 PM. The purpose of the meeting was to review and discuss the Environmental Inventory Report. Other topics included the project status, review of major environmental issues, and a discussion of the future role of the CRG.

The next meeting of the CRG was held on September 14, 1981. Discussions at this meeting related to the alternatives under consideration. Members of the CRG were asked for their comments and concerns related to the alternatives being considered. Some of the issues and potential environmental impacts associated with the alternatives that had previously been identified were also described for the CRG members. A follow-up meeting was held on October 28, 1982 at 3:00 PM to discuss the EIS plan of study for the evaluation of effluent transmission/disposal alternatives.

The fifth meeting of the CRG was held on February 10, 1983. At this meeting, the 201 Plan alternatives were again reviewed, and the EIS impacts evaluation of the effluent disposal alternatives was summarized and discussed. A considerable number of comments were voiced by the CRG and focused on two major issues. These were the impacts on water resources and odor problems adjacent to disposal sites. The CRG members suggested that due to confusion about the 201 Plan there needed to be a more intensive public information program, especially in the area of the proposed disposal systems.

Four days after the fifth CRG meeting, a public hearing was held at the Orlando City Hall to review the 201 alternatives and approve the recommended alternative. Another public hearing was held on the following day at the Orange County Courthouse for the same purpose.

TABLE V-3

SOUTHWEST ORANGE COUNTY 201 EIS
CITIZENS REVIEW GROUP

MEMBER	REPRESENTING
Ms. Geraldine Aldridge	Private Citizen
Colonel William E. Nix	Private Citizen
William B. Boltin III	Private Citizen
Mr. John M. Nabors	Private Citizen
Mr. Corbin C. Ballentine	Private Citizen
Mr. Bob Davis	Private Citizen
Mr. John Cope	Private Citizen
Mr. Ellias N. Chotas	Private Citizen
Mrs. Kathy Wacker	Private Citizen
Mr. James M. Thomas	BioScape
Mr. Rick Amick	Private Citizen
Ms. Agnes Foote	Private Citizen
Mr. John Morrison	Private Citizen
Mr. Art Cole	Private Citizen
Mr. Roy Dye	Bel-Aire Homes
Mr. John Lowndes	Lowndes, Drosdick and Doster, P.A.
Ms. Carolyn Greer	Windermere Realty
Mr. Robert H. Elrod	Windermere Realty
Mr. Robert H. Freeman President	T.H. Freeman & Sons, Inc.
Mr. Ralph Sias	Private Citizen
Mr. Jon Ramer	Private Citizen

TABLE V-3

SOUTHWEST ORANGE COUNTY 201 EIS
CITIZENS REVIEW GROUP
(Continued)

MEMBER	REPRESENTING
Mr. Howard Mallen	Private Citizen
Mr. John Rinehart	Private Citizen
Mr. Henry Swanson	Private Citizen

A series of meetings with West Orange County residents in the Lake Avalon area was initiated on February 23, 1983 to discuss the project and the concerns of the residents. Continuing refinements to the project resulted and County/City resolutions adopted in response to these meetings and the continuing dialogue.

A public meeting was held on April 18, 1983 by the Florida Department of Environmental Regulation at the West Orange High School to ascertain the position and concerns of the citizens of the area regarding the recommended plan. The major concerns expressed at this meeting related to water resource impacts, odors from the disposal sites and impacts on property values.

Public hearings for the purpose of adopting the selected 201 Plan were held on July 16, 1984 at Orlando City Hall and the Orange County Courthouse. There was no public opposition to the selected plan voiced at either of the two hearings.

The last CRG meeting was held on September 27, 1984. The purpose of the meeting was to review the Environmental Impacts Evalution of the Selected Plan and measures which have or could be used to mitigate projected adverse impacts.

D. Written Comments and Responses

1. Mr. Henry Dean, Executive Director, St. Johns River Water Management District, Letter of January 22, 1985 and attached memo report.

    Comment: We find this report to be a comprehensive treatment of direct and indirect sewage effluent reuse and disposal alternatives carefully balanced for cost-effectiveness, operability, implementability and environmental acceptability.

    Response: No response needed.

2. Mr. Frederick E. Davis, Division Director Water Chemistry Division Resource Planning Department, South Florida Water Management District, Letter of January 24, 1985.

    Comment: On page III-5 in the Water Quality section, it is stated that a potential exists for causing impact to surface waters of adjacent lakes and ponds via nutrient transport in groundwater flow. In anticipation of such an event occurring, some questions are raised that should be addressed at this time.

    As no State criteria exist for nutrients, the first question is to establish what criteria will be used to judge if the surface waters are impacted sufficiently enough to require corrective action. The second question is to specify who will interpret these criteria. The most important question, however, is what kinds of corrective actions are there that could be taken to alleviate a problem caused by nutrient transport in groundwaters?

In summary, given the stated potential for impact, we feel these issues should be addressed and specific action identified prior to approval of this plan rather than be given such cursory treatment at this time.

Response: The Draft EIS document contains only a summary of the potential for impacts to the water quality of adjacent lakes. This was evaluated in more detail previously and reported in an EIS task report (Task Elements IV, V and VI - Environmental Impacts Evaluation of the Selected Plan, July 1984), which is available for review. That evaluation included a lake sampling program, characterization of the existing quality of the lakes, computation of the Trophic State Index (TSI) for the six potentially affected lakes, and an evaluation of subsurface nutrient removal mechanisms and their effectiveness. The water quality evaluation concluded that no significant impacts were anticipated due to the operation of the proposed project. Judgement as to the need for corrective action due to the project would appear to be best made by an on-going comparison of the data from the continuing monitoring program and background data, which might include calculation and recording of TSI values. Corrective actions to alleviate problems caused by nutrient transport to the adjacent lakes are numerous. Some of these are listed in the EPA Grant Condition provided on page IV-31 of the Draft EIS document.

3. Colonel Robert M. Brantly, Executive Director, Florida Game and Fresh Water Fish Commission, Letter of January 3, 1985.

   Comment: We strongly support the combined citrus irrigation/rapid infiltration basin option which your agency has selected as the preferred alternative for wastewater disposal. We do not anticipate any significant adverse environmental impacts relating to fish and wildlife as a result of implementing the preferred alternative. It is our considered opinion that this option provides the maximum level of protection possible for our surface waters and associated fish and wildlife communities.

   Response: No response needed.

4. Mr. Stephen Margolis, Ph.D., Chief, Environmental Affairs Group, Environmental Health Services Division, Center for Environmental Health, Letter of February 4, 1985.

a. Comment: Based on an evaluation of the identified alternatives, we concur that the citrus irrigation/rapid infiltration basin alternative appears to be environmentally preferable. The ability of the sponsors to monitor and control potential adverse impacts of this alternative may be greater than with other alternatives, and implementation of planned design, operation, and monitoring criteria should serve to mitigate potential subsequent adverse impacts.

Response: No response needed.

b. Comment: It is stated on page 12 that under the preferred alternative both wastewater treatment facilities will be expanded and upgraded, and they will consist of secondary treatment followed by filtration and high level disinfection "suitable for irrigation with unrestricted public access and human contact." Our concern lies in the fact that the distribution system will supply the renovated wastewater, under pressure, to the grove owners property line. Construction, operation, and maintenance of all required irrigation equipment and distribution piping on the grove owners property will be the responsibility of the individual property owners. We do not believe the Draft EIS has adequately defined "required" practices for safeguarding against potential public health hazards associated with this available non-potable water supply. Exhibit C, Appendix D, addresses the "intent" of the sponsors with regard to operating restrictions and incorporates excellent public health guidelines. Because of the obvious importance of recipient responsibilities, we recommend that portions of Exhibit C relevant to public health issues be summarized and presented in the text of Chapter IV, D., Mitigation Measures.

Response: Having been incorporated into the Draft EIS as Appendix D, we feel that the issues in Exhibit C have been adequately addressed. The measures in Exhibit C were not discussed in Chapter IV of the Draft EIS because these measures are part of the project definition, and are therefore not considered as "mitigative" measures. Exhibit C has been incorporated in the Final EIS as Appendix A.

c. Comment: Depending on the specific chlorine compound used in effluent disinfection, long-term land application could have an effect on soil conditions, such as pH. The Final EIS should identify the type of chlorine to be used, and address any potential impacts.

Response: Chlorine gas will be used for effluent disinfection. The pH of the effluent, as stated in the growers' Agreement, will be maintained in the 6.5 to 8.4 range. No potential impacts are expected.

d. Comment: Several sludge disposal options were considered (page II-24), and landfilling was chosen "as the least cost method." In many instances, composting and landspreading offer excellent alternatives to landfilling. It is our view that cost alone should not be the only deciding factor. Application of sewage sludge or composted solid waste/sewage sludge to cropland can benefit agriculture provided that heavy metals and other contaminants are within acceptable limits. It is stated on page IV-16 that both the City and County have already developed industrial pretreatment programs to monitor and control the discharge of industrial wastes into the sanitary sewer systems. With such mitigative effort already being implemented, we believe that alternatives for sludge disposal, which may in the long term prove to be more beneficial to this region than landfilling, should be given careful consideration and study.

Response: EPA regulations require that selected alternatives for EPA-funded projects be cost-effective, and composting and landspreading were not found to be cost-effective. Sludge disposal alternatives were carefully assessed and evaluated in a prior EIS report (Task Element III, Section D - Environmental Assessment of Sludge Management Alternatives, January 28, 1983), which is available for review.

5. Ms. Joyce M. Wood, Chief, Ecology and Conservation Division, United States Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C., Letter of February 19, 1985 and attached memorandum:

Comment: Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, the National Ocean Service (NOS) requires not less than 90 days notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project include the cost of any relocation required for NOS monuments.

Response: No response needed.

6. Mr. Van R. Hoofnagle, P.E., Administrator, Facilities Planning Section, Bureau of Wastewater Management and Grants, Department of Environmental Regulation, Tallahassee, Florida, Letter of January 31, 1985.

a. Comment: On Page IV-9, Section B.4, two 95-foot diameter gravity thickeners were mentioned as part of the sludge management process for the Sand Lake Road Wastewater Treatment Facility. On Page 8-8, Section 8.4.1 of the Southwest Orange County 201 Facilities Plan, three 50-foot diameter gravity thickeners were indicated for sludge thickening process in the Sand Lake Road Wastewater Treatment Facility. It appears that there is a discrepancy of the number and size of sludge gravity thickeners proposed for the project as discussed in both documents.

It was also indicated that the existing aerobic digesters are going to be converted to anaerobic digesters. Table 8-2, Page 8-7 of the Southwest Orange County 201 Facilities Plan, indicated that the existing aerobic digesters are going to be removed and that new anaerobic digesters are going to be installed.

Response: There will be three 50-foot diameter gravity thickeners utilized for the sludge thickening process. The existing aerobic digesters will be removed and replaced with new anaerobic digesters.

b. Comment: Lack of consideration with regard to the location of potable water wells, both for existing and future needs, and the protection of these drinking water resources has been noted in the preparation of the EIS. The department would like to see consideration given to quantifying future potable water needs of the area and evaluating where and how these needs will be met.

Response: The locations of the individual RIBs have been selected to provide a minimum buffer zone of 100 feet from the property lines. In most cases, the buffer zone is a minimum of 200 feet from the property lines. The closest potable water well is located near RIB Site 7, at a distance of about 400 feet from the nearest rapid infiltration basin. The next closest potable water well is 760 feet from RIB #6-38 (RIB Site 6).

According to the traffic zone data presented in Volume Two of Task Elements I and II (Background and the Existing Environment, March 1981), no increase in population is projected for the areas selected for the RIBs and the citrus distribution network. Therefore, through the Year 2000, demand for potable water will not increase. In addition, page IV-16 of the Draft EIS describes the groundwater monitoring program that will be implemented to ensure the maintenance of acceptable quality in the percolated effluent. The effects on groundwater quality were evaluated in detail in prior EIS task reports including Task Element III (Alternatives Evaluation, January 28, 1983) and Task Elements IV, V and VI (Environmental Impacts Evaluation of the Selected Plan, July 1984), which were provided to the Florida Department of Environmental Regulation as they were completed.

c. Comment: On Page IV-14, Section B.4, stabilized sludge from the Sand Lake Wastewater Treatment Facility will be trucked to the Orange County Model Landfill for final disposal. An evaluation of the landfill should be undertaken to ensure that adequate capacity at this site exists to handle all the sludge generated from this plant, over the 20-year planning period.

Response: This evaluation was accomplished in Task Element III.D, Environmental Assessment of Sludge Management Alternatives, page IIID.3.10-4. There was found to be no significant impact on the useful life of the Orange County Model Sanitary Landfill.

E. Oral Comments and Responses at Public Hearing - January 31, 1985.

1. Mr. Bob Mackey, area resident and citrus grower.

Comment: What will be the effect of the recent freeze on the citrus irrigation program, and secondly, has the effect of Temik from the irrigated groves been addressed?

Response: It is too early to assess the extent of the damage to the trees. However, it is anticipated that the citrus industry will remain viable. The City of Orlando has recently signed another 2 MGD to the program, and the largest grower participating in the program has indicated to the City that his firm is still ready to proceed.

The effects of Temik in groundwaters were addressed in a previous EIS report, Task Element III - Alternatives Evaluation. It was determined that contamination of the Floridan aquifer due to the citrus irrigation program is unlikely.

2. Mr. Dean Campbell, St. Johns River Water Management District

Comment: What will happen to the existing grove irrigation wells which will not be needed after implementation of the citrus irrigation project?

Response: It is anticipated that those wells which will not be required for other purposes will be capped and abandoned in accordance with state requirements.

3. Dr. Emery Szabo, Vice President of the Avalon Homeowners Association.

Comment: Will the County test private wells prior to the implementation of the selected plan, and monthly thereafter in order to detect changes in the water quality?

Response: It is recommended that the County sample and analyze all domestic water supply wells within a half mile of RIB boundaries to establish actual background conditions. Copies of the analyses should be provided to the homeowners. A schedule for continuing monitoring of these or selected wells should be considered.

4. Mr. Al Ganich, area resident.

Comment: The homeowners in the designated area for the selected plan were not informed of the project when it began six years ago.

Response: Six years ago, when the initial planning began and the first public hearings were held, the method and location of effluent disposal were not known. At the end of 1982 when the effluent disposal alternatives and sites were being more precisely defined, several meetings with the Citizen's Review Group were held by EPA and Orange County to obtain comments from representatives of the area. Newspaper articles and advertised public meetings were used as a means to convey information to the general public. At that time, the Lake Avalon area residents became concerned with the project due to published project planning maps which included their properties within alternative land application areas. When the Lake Avalon Home and Property Owners Association became involved in the project, the actual boundaries of the RIB sites had not been finalized. The Orange County Commission resolution dated February 15, 1983 recognized the Association and pledged their cooperation in the further refinement of the project. At least 6 meetings were held by the County with the Avalon area residents and additional meetings were held by the City of Orlando for the citrus growers. The County is still holding meetings with the Avalon area residents regarding the Reforestation Plan and buffer areas at the RIB sites.

ST. JOHNS RIVER
WATER
MANAGEMENT
DISTRICT

POST OFFICE BOX 1429 • PALATKA, FLORIDA 32078-1429
904/328-8321

20-095-PLA-28-08

January 22, 1985

ENVIRONMENT [illegible]
RECEIVED
JAN 25 1985
EPA-REGION IV
ATLANTA, GA.

Mr. Robert C. Cooper, Project Officer
Environmental Assessment Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

Dear Mr. Cooper:

The SJRWMD has completed its review of the draft EIS entitled Southwest Orange County, Florida Wastewater Management prepared by the USEPA (memo report attached).

We find this report to be a comprehensive treatment of direct and indirect sewage effluent reuse and disposal alternatives carefully balanced for cost effectiveness, operability, implementability and environmental acceptability.

We believe the preferred alternative of Citrus Irrigation / Rapid Infiltration Basins should be approved and permitted as an innovative and progressive demonstration that sewage effluent can be effectively treated and reused directly to achieve beneficial purposes.

Our organization is committed to the promotion of expanded technologies and designs which will facilitate the practical utilization of wastewater for a wide range of direct reuse applications. For this reason, we applaud the agricultural interests involved, Orange County and its municipal leaders and your organization for this creative solution to an age-old problem.

Sincerely,

Henry Dean

HENRY DEAN
Executive Director

HD/BDA:mn
Attachment
cc: Hon. Bill Frederick, Mayor, City of Orlando
Hon. Lou Treadway, Chairman, Orange Co. Board of Co. Comm.
Governing Board

IDWAL H. OWEN, JR.
Chairman - Jacksonville
MICHAEL BRADDOCK
Vice-Chairman - Pierson
LYNNE CAPEHART
Secretary - Gainesville
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FRANCES S. PIGNONE
Orlando
JIM T. SWANN
Cocoa
D. A. (DAN) MARTINEZ
Palatka
JOHN L. MINTON
Vero Beach
HENRY DEAN
Executive Director

MEMORANDUM 20-095-PLA-28-08

DATE: January 14, 1985

TO: Brice Dennis Auth, Director
Department of Executive Planning and Coordination

FROM: Dean M. Campbell, Engineer DMC
Department of Executive Planning and Coordination

RE: Review Request - Draft E.I.S. for Southwest Orange County, FL

The United States Environmental Protection Agency will hold a public hearing on January 31, 1985 to receive comments on the Southwest Orange County Waste Water Management Draft E.I.S. We have received a copy of this draft and have reviewed the methodology and alternatives to determine if the recommended plan is consistent with the District's emerging reuse policy.

Within the 201 planning area, are two wastewater treatment facilities owned and operated by Orange County and the City of Orlando. Both of these plants which have surface water discharges to Shingle Creek, have been operating for several years under temporary operating permit from FDER until plans to eliminate discharges can be implemented, in accordance with USEPA directives to discontinue the surface water discharges.

In 1977 a test well was constructed by Orange County to determine the feasibility of deep well injection as a wastewater disposal alternative. The test results determined that this method was not a viable option and subsequently Orange County agreed to act as lead applicant for a grant from EPA to prepare a 201 Facilities Plan for the Southwest Orange County 201 Planning Area. Accompanying this agreement was a memorandum of understanding which provided that a "piggy-back" E.I.S. would be prepared "in connection with the planning, design and construction of treatment works in Orange County".

The major issues addressed in the E.I.S. include the means of effluent disposal, effects on area water resources and economic impacts of secondary growth.

Nine different technical alternatives for wastewater disposal were considered in the Draft E.I.S. Each one is summarized separately below.

1) Discharge to Shingle Creek

This alternative involves the continued discharge of effluent to Shingle Creek with the assumption that the effluent would receive advanced treatment. This alternative is contrary to the agreement to cease discharge and was included only to determine levels of EPA grant funding.

2) Shallow Well Injection

This alternative involves the injection of highly treated wastewater effluent into the upper zone of the Floridan Aquifer through a series of injection wells spaced at 1,000 foot intervals. This alternative was considered as a means of replenishing the aquifer.

3) Citrus Irrigation

This alternative involves the slow rate irrigation of about 10,000 acres of existing citrus groves in Western Orange County and Eastern Lake County. The treatment level for this alternative involves secondary treatment followed by filtration and high level disinfection. Also included in this alternative is the construction of a reserve storage reservoir with a maximum area of 420 acres at 5.5 feet of depth to provide enough water for use during peak demand such as for freeze protection.

4) Rapid Infiltration Basins

This method of disposal involves the application of treated effluent to infiltration basins located in the well drained sandy soils of Western Orange County. The basins would be flooded for a period of about two weeks and then allowed to dry for the same amount of time. This method would recharge the water table and move downward or laterally away from the site. The same treatment level required for citrus irrigation would be required for this alternative.

5) Deep Well Disposal

This alternative involves the injection of treated effluent into a highly transmissive rock zone containing high chloride water.

6) Combined Citrus Irrigation/Rapid Infiltration

This alternative combines alternatives 3 and 4 above. Because wells would be used to satisfy the peak demand requirements, no storage reservoir would be necessary in this alternative. The level of treatment would again be secondary with filtration and high level disinfection. The Rapid Infiltration basins would be used to dispose of any excess water not used for irrigation especially during wet periods.

7) On Lot Disposal

This alternative involves the combination of Citrus Irrigation, Rapid Infiltration Basins with On Lot. or septic tank systems, servicing about 2.3 mgd of the projected year 2000 wastewater flow.

8) No Federal Action

This alternative suggests the use of septic tank and locally funded subregional facilities to treat the wastewater flow in excess of the existing design capacities of the two existing treatment facilities. Disposal of effluent from the three subregional facilities would be through the Citrus Irrigation/Rapid Infiltration Basin alternatives and would require secondary treatment followed by filtration and high level disinfection.

9) The No Action Alternative

This alternative would involve no action on the part of the 201 participants. The existing facilities would continue to discharge to Shingle Creek and as growth occurred, new hookup would be allowed until the maximum capacity was reached. Any additional development would be required to provide their own wastewater treatment and disposal facilities.

The evaluation of the proposed alternatives was done on the basis of cost, operability, implementability and environmental impact.

The economic analysis identified four alternatives within ten percent of the least cost alternative. Based upon the level of precision of the cost analysis these four alternatives are considered economically equal, on a present worth cost basis, and therefore could receive funding from EPA. These alternatives are 1) Rapid Infiltration Basins, 2) Citrus Irrigation/Rapid Infiltration, 3) On Lot Systems and 4) No Federal Action. The final three incorporate the combined Citrus Irrigation/Rapid Infiltration disposal method.

The operability analysis of the alternatives leads to the conclusion that the least flexibility would be afforded by the Rapid Infiltration Basin alternative and that the largest scale and complexity is associated with the No Federal Action alternative.

With exception of the No Federal Action alternative all of the four least cost alternatives would be equally implementable. The No Federal Action alternative would result in substantially increased user charges and/or development costs and thus could have significant implementation problems due to its public disapproval.

Environmental impacts were judged to be greatest for the Rapid Infiltration Basin alternative, due to the greater level of impact on lake and groundwater levels than the Citrus Irrigation alternatives.

The Preferred Alternative

Based upon a systematic evaluation of all of the presented alternatives the Citrus Irrigation/Rapid Infiltration Basin alternative was selected as the most cost-effective and environmentally sound alternative. This alternative was chosen over the Rapid Infiltration and On Lot disposal methods on the basis of operational flexibility and cost, respectively.

Report Recommendations and Emerging SJRWMD Reuse Policy

The Draft E.I.S. report states that the recommended alternative was chosen on the basis of cost, operability, implementability and environmental impacts. The fact that the recommended alternative also provides for the highest and best use of the effluent as a water resource by enabling the wastewater to be directly reused should not only provide the impetus for the District to support the recommendation of the study but also to further recommend to other municipalities and county governments that they consider this alternative in their long range waste disposal planning.

The recommended alternative provides the citrus industry within the 201 study area with a ready source of acceptable quality water for irrigation, which will replace the current use of higher quality water being withdrawn from the groundwater supply. This use of lower quality waste water to replace an existing use of high quality gorundwater is the fulfilment of the intent of the District's emerging reuse policy.

It is my recommendation that the District support Orange County in its attempt to obtain public support for the recommended alternative. This could be accomplished through the submission of written supportive comments to the hearing officer in advance of the January 31 hearing or through active participation in the hearing itself through representative attendance. Orange County should be commended for its effort to maximize beneficial use of our water resources.

I would further recommend that this Draft E.I.S. (or the finalized version) be provided to other municipalities or county governments as an exemplary methodology for examining wastewater disposal alternatives. The selection process presented therein shows how reuse can be combined with other disposal methods to provide an economically and environmentally acceptable means of waste disposal, while providing a beneficial use of wastewater as a valuable resource.

DMC:sda

South Florida
Water Management District

John R. Wodraska, Executive Director

Post Office Box V 3301 Gun Club Road
West Palm Beach, Florida 33402
Telephone (305) 686-8800
Florida WATS Line 1-800-432-2045

IN REPLY REFER TO:

ENVIRONMENTAL
JAN 23 1985

January 24, 1985

Mr. Robert C. Cooper
Project Officer
Environmental Assessment Branch
EPA, Region IV
345 Courtland Street, NE
Atlanta, GA 30365

Dear Mr. Cooper:

We have recently had opportunity to review the Southwest Orange County, Florida Wastewater Management Draft Environmental Impact Statement. We would like to make the following comments at this time.

The State's Department of Environmental Regulation has delegated to the South Florida Water Management District concurrent responsibility for overseeing and maintaining the quality of the surface waters within the District's jurisdictional boundaries. The proposed project lies in part at least, if not wholly within those jurisdictional boundaries.

On page III-5 in the Water Quality section, it is stated that a potential exists for causing impact to surface waters of adjacent lakes and ponds via nutrient transport in groundwater flow. In anticipation of such an event occurring, some questions are raised that should be addressed at this time.

As no State criteria exist for nutrients, the first question is to establish what criteria will be used to judge if the surface waters are impacted sufficiently enough to require corrective action. The second question is to specify who will interpret these criteria. The most important question, however, is what kinds of corrective actions are there that could be taken to alleviate a problem caused by nutrient transport in groundwaters?

In summary, given the stated potential for impact, we feel these issues should be addressed and specific action identified prior to approval of this plan rather than be given such cursory treatment at this time.

Sincerely,

Frederick E. Davis
Division Director
Water Chemistry Division
Resource Planning Department

ALG/trm
cc P Rhoads
T Schwartz

Stanley W. Hole
Chairman - Naples

William E. Sadowski
Vice Chairman - Miami

J. Neil Gallagher
St. Cloud

Nathaniel P. Reed
Hobe Sound

Kathleen Shea Abrams
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FARRIS BRYANT BUILDING
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Tallahassee, Florida 32301
(904) 488-1960

January 3, 1985

ASSESSMENT BRANCH
JAN 07 1985
RECEIVED
EPA-REGION IV
ATLANTA, GA.

Mr. Robert C. Cooper, Project Officer
Environmental Assessment Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: EPA 904/10-84-123

Draft EIS - Southwest Orange County, Florida, Waste Management

Dear Mr. Cooper:

The Commission staff has reviewed the above cited draft EIS, and concurs with the recommendations contained therein.

Specifically, we strongly support the combined citrus irrigation/rapid infiltration basin option which your agency has selected as the preferred alternative for wastewater disposal. We do not anticipate any significant adverse environmental impacts relating to fish and wildlife as a result of implementing the preferred alternative. It is our considered opinion that this option provides the maximum level of protection possible for our surface waters and associated fish and wildlife communities.

We commend your agency and other contributors to this EIS for a job well done.

Sincerely,

Robert M. Brantly
Colonel Robert M. Brantly
Executive Director

RMB/cah
F-82

DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service

Centers for Disease Control
Atlanta GA 30333

February 4, 1985

ENVIRONMENTAL ASSESSMENT [illegible]
RECEIVED
FEB 06 1985

Mr. Robert C. Cooper
Project Officer
NEPA Compliance Section
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Cooper:

We have reviewed the Draft Environmental Impact Statement (EIS) for Southwest Orange County, Florida Wastewater Management. We are responding on behalf of the U.S. Public Health Service.

The EPA has determined, in accordance with recommendations of various Federal, State and regional water quality studies, that nutrient loadings from the Orange County Sand Lake Road and City of Orlando McLeod Road treatment plants have contributed to the eutrophication of Lake Tohopekaliga. Both plants are operating under temporary permits from the Florida Department of Environmental Regulation (FDER). The current NPDES Permits issued by the U.S. EPA state that "in the future no discharge to surface waters will be permitted." Thus, the "no action" alternative is considered unacceptable.

Based on an evaluation of the identified alternatives, we concur that the citrus irrigation/rapid infiltration basin alternative appears to be environmentally preferable. The ability of the sponsors to monitor and control potential adverse impacts of this alternative may be greater than with other alternatives, and implementation of planned design, operation, and monitoring criteria should serve to mitigate potential subsequent adverse impacts.

It is stated on page 12 that under the preferred alternative both wastewater treatment facilities will be expanded and upgraded, and they will consist of secondary treatment followed by filtration and high level disinfection "suitable for irrigation with unrestricted public access and human contact." Our concern lies in the fact that the distribution system will supply the renovated wastewater, under pressure, to the grove owners property line. Construction, operation, and maintenance of all required irrigation equipment and distribution piping on the grove owners property will be the responsibility of the individual property owners. We do not believe the Draft EIS has adequately defined "required" practices for safeguarding against potential public health hazards associated with this available non-potable water supply. Exhibit C, Appendix D addresses the "intent" of the sponsors with regard to operating restrictions and incorporates excellent public health

110<

guidelines. Because of the obvious importance of recipient responsibilities, we recommend that portions of Exhibit C relevant to public health issues be summarized and presented in the text of Chapter IV, D. Mitigation Measures.

Depending on the specific chlorine compound used in effluent disinfection, long-term land application could have an effect on soil conditions, such as pH. The Final EIS should identify the type of chlorine to be used, and address any potential impacts.

Several sludge disposal options were considered (page II-24), and landfilling was chosen "as the least cost method." In many instances, composting and landspreading offer excellent alternatives to landfilling. It is our view that cost alone should not be the only deciding factor. Application of sewage sludge or composted solid waste/sewage sludge to cropland can benefit agriculture provided that heavy metal and other contaminants are within acceptable limits. It is stated on page IV-16 that both the city and county have already developed industrial pretreatment programs to monitor and control the discharge of industrial wastes into the sanitary sewer systems. With such mitigative effort already being implemented, we believe that alternatives for sludge disposal, which may in the long term prove to be more beneficial to this region than landfilling, should be given careful consideration and study.

With exception to the above comments, we believe that the planning efforts exhibited by this comprehensive report are commendable. The discussions presented on expected and potential impacts, including lake levels, groundwater levels, water quality, land use, aesthetics, and other aspects are thorough. We believe the mitigative efforts and monitoring programs planned will be effective in developing the selected alternative.

Thank you for the opportunity to review this draft document. Please send us a copy of the Final EIS when it becomes available. If you should have questions concerning our comments, please call Mr. Ken Holt of our staff at 404-452-4161 or FTS 236-4161.

Sincerely yours,

Lee W. Miller

for Stephen Margolis, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

OFFICE OF THE ADMINISTRATOR

February 19, 1985

Mr. Robert C. Cooper, Project Officer
Environmental Assessment Branch
EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Cooper:

This is in reference to your draft environmental impact statement for Southwest Orange County, Florida Wastewater Management. Enclosed are comments from the National Oceanic and Atmospheric Administration.

We hope our comments will assist you. Thank you for giving us an opportunity to review the document. We would appreciate receiving four copies of the final environmental impact statement.

Sincerely,

Joyce Wood
Joyce M. Wood
Chief, Ecology and
Conservation Division

Enclosure

DC:lg

ENVIRONMENTAL ASSESSMENT BRANCH
RECEIVED
FEB 22 1985
EPA-REGION IV
ATLANTA, GA.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Washington, D.C. 20230

February 19, 1985

N/MB2:KEZ

Rec'd 2-19-85

DC
2/19

TO: PP2 - Joyce M. Wood

FROM: N - Paul M. Wolff

SUBJECT: DEIS 8412.05 - Southwest Orange County, Florida Wastewater Management

The subject DEIS has been reviewed within the areas of the National Ocean Service's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

Geodetic control survey monuments may be located in the proposed project area. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments. For further information about these monuments, please contact Mr. John Spencer, Chief, National Geodetic Information Branch (N/CG17), or Mr. Charles Novak, Chief, Network Maintenance Section (N/CG162), at 6001 Executive Boulevard, Rockville, Maryland 20852.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

January 31, 1985

Mr. Robert C. Cooper
Project Officer, NEPA Compliance Section
U. S. Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: C120692010 (Step 1) - Orange County
Southwest Facilities Plan
Environmental Impact Statement (Draft)

Dear Mr. Cooper:

The Department of Environmental Regulation has completed the review of the draft Environmental Impact Statement (EIS) for the Southwest Orange County dated October, 1984. Our comments are attached for your consideration during the preparation of the final document.

If you have any questions, please call Mr. Jun Tabanguil, P.E., at (904) 488-8163.

Sincerely,

Van R. Hoofnagle

Van R. Hoofnagle, P.E., Administrator
Facilities Planning Section
Bureau of Wastewater Management and Grants

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RECEIVED
FEB 05 1985
EPA-REGION IV
ATLANTA, GA.

VRH/jtw

cc: Lou Treadway - Orange County
Bill Frederick - Orange County
Mike Gritzuk - Orange County
Bob Haven - Orlando
Dean Whitney - CDM (w/attachment)
Kermit Prime - Boyle Engineering (w/attachment)
John Hagan - EPA (w/attachment)
George Prinsen - DER/Orlando (w/attachment)

REVIEW COMMENTS

C120692010 (Step 1) - Orange County
Environmental Impact Statement
January 30, 1985

1. On Page IV-9, Section B.4, two 95-foot diameter gravity thickeners were mentioned as part of the sludge management process for the Sand Lake Road Wastewater Treatment Facility. On Page 8-8, Section 8.4.1 of the Southwest Orange County 201 Facilities Plan, three 50-foot diameter gravity thickeners were indicated for sludge thickening process in the Sand Lake Road Wastewater Treatment Facility. It appears that there is a discrepancy of the number and size of sludge gravity thickeners proposed for the project as discussed in both documents.

   It was also indicated that the existing aerobic digesters are going to be converted to anaerobic digesters. Table 8-2, Page 8-7 of the Southwest Orange County 201 Facilities Plan, indicates that the existing aerobic digesters are going to be removed and that new anaerobic digesters are going to be installed.

   The above-mentioned discrepancies should be taken into consideration during the preparation of the final EIS document.

2. Lack of consideration with regard to the location of potable water wells, both for existing and future needs, and the protection of these drinking water resources has been noted in the preparation of the EIS. The department would like to see consideration given to quantifying future potable water needs of the area and evaluating where and how these needs will be met.

3. On Page IV-14, Section B.4, stabilized sludge from the Sand Lake Wastewater Treatment Facility will be trucked to the Orange County Model Landfill for final disposal. An evaluation of the landfill should be undertaken to ensure that adequate capacity at this site exists to handle all the sludge generated from this plant, over the 20-year planning period.

United States Department of the Interior
OFFICE OF ENVIRONMENTAL PROJECT REVIEW
Southeast Region / Suite 1360
Richard B. Russell Federal Building
75 Spring Street, S.W. / Atlanta, Ga. 30303

Telephone 404/221-4524 - FTS: 242-4524

FEB 11 1985

[illegible] IV
[illegible] GA.

ER-84/1583

Mr. Robert C. Cooper, Project Officer
Environmental Assessment Branch
EPA, Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Cooper:

The Department of the Interior has reviewed the Draft Environmental Statement, Wastewater Management, Southwest Orange County, Florida, and has no comments to offer.

Thank you for the opportunity to comment on this Statement.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer

STATE OF FLORIDA
Office of the Governor
THE CAPITOL
TALLAHASSEE 32301-8047

BOB GRAHAM
GOVERNOR

March 18, 1985

ENVIRONMENTAL ASSESSMENT BRANCH
RECEIVED
MAR 21 1985
EPA-REGION IV
ATLANTA, GA.

Mr. Robert C. Cooper
Project Officer
EPA, Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Cooper:

Pursuant to your request this Office reivewed and coordinated a review of your Draft Environmental Impact Statement for Southwest Orange County, Florida. Attached for your consideration are comments from the Departments of Commerce, State and Game and Fresh Water Fish Commission. We request that you consider their views in developing the final document.

Thank you for the opportunity to review this document.

Sincerely,

Walter O. Kolb

Walter O. Kolb
Sr. Governmental Analyst

WOK/jkc

An Affirmative Action/Equal Opportunity Employer

FLORIDA WASTEWATER MANAGEMENT DRAFT EIS
January 31, 1985 at 7:30 P.M.
WEST ORANGE HIGH SCHOOL AUDITORIUM
1625 South Beulah Road
Winter Garden, Florida

Order Number 5R-0589-TNSA

- - - - -

ENVIRONMENTAL PROTECTION AGENCY

ROBERT COOPER, CHAIRMAN
NEPA COMPLIANCE SECTION
345 Courtland Street, N. E.
Atlanta, Georgia 30365

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ST. JOHNS RIVER DISTRICT
State of Florida
Department of Environmental Regulation
3319 Maquire Boulevard, Suite 232
Orlando, Florida 32803

MICHAEL CLIBURN
MAYES, SUDDERTH AND ETHEREDGE, INC.
5750 Major Boulevard
Orlando, Florida

- - - - -

DAHLIA R. RAINES
COURT REPORTER
502 East Anderson Street
Orlando, Florida 32801

Telephone: (305) 841-8916

- - - - -

APPEARANCES:

SPEAKERS

Robert C. Cooper

Michael Cliburn

George H. Prinsen

Bob Mackey

Dr. Emery Szabo

Gabe Delneky

Nancy Szabo

Nancy Wheeler

Sherry Lewis

Al Granich

Dean Campbell

Keith Rice

Rev. Poor

- - - - -

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MR. COOPER: Good evening ladies and gentlmen, I would like to call this public hearing to order. I would like to welcom you here tonight on behalf of the United States Environmental Protection Agency

First of all, I would like to tell you that my name is Robert Cooper, I am the Project Officer on this project. I work in the NEPA Compliance Section, Region Four in Atlanta. On my right is George Prinsen, Engineer with the St. Johns River District of Florida Department of Environmental Regulation. On my left is Mike Cliburn, who is the Project Director for Mayes Sudderth and Etheredge. Mike's office is here in Orlando.

The purpose of this hearing is to develop a record and to receive comments on the draft environmental impact statement which was recently issued relative to waste treatment facilities in Southwest Orlando and Orange County.

I want to welcome all of you to the hearing; I want you to understand this is your hearing, and it is for the purpose of information and I want you to feel free to participate.

If you have not filled out a card when you came in, and indicated your interest in making a statement at this hearing, I would ask you to please

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do so. Even if you do not wish to make a statement, you should fill out a card, because this becomes a part of our permanent record and enables us to sent you a copy of the final environmental impact statement when it is issued.

The EIS we are here to discuss tonight is being prepared to evaluate alternatives for wastewater facilities in the Southwest Orange County Planning area. The expenditure of Federal funds for waste water facilities and the preparation of EIS's are authorized by the Clean Water Act, and the National Environmental Policy Act known as NEPA.

The Clean Water Act enables EPA to fund eligible costs for the planning, design and construction of wastewater facilities. The planning phase, or Step 1 of this process results in the preparation of a 201 facilities plan. The National Environmental Policy Act of 1969, requires the preparation, of an environmental impact statement for major Federal actions significantly affecting the quality of the human environment. The purpose of the impact statement is to ensure that environmental and social factors are considered in addition to economic and technical factors during the decision-making process.

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When the Step 1, 201 grant for this project was issued in 1978, it was clear that several major issues would have to be dealt with. These issues included the means of effluent disposal, effects on area water resources, and the environmental and economic impacts of secondary growth. Because of the complexity of these issues, EPA decided to prepare an EIS in conjunction with the preparation of the 201 facilities plan for this area.

Accordingly, in October of 1978, a notice of intent to prepare an EIS was issued. Since that time, the 201 plan and EIS have been developed concurrently with extensive feed-back between the two complementary efforts. The heart of the 201 and EIS processes is the development and evaluation of alternatives for wastewater collection, treatment and disposal. Centralized systems were considered only in the area designated for the provision of urban services in the approved growth management plans. The majority of land in the 201 planning area is designated as rural service area. Publicly owned wastewater or water supply systems are, by policy, not to be provided in the area. Projected year 2000 wastewater flows of about 43 million gallons per day were estimated for the urban service

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area portion of the planning area based on population projections developed for Orange County and the City of Orlando.

The alternative, which were developed in studying 201 and EIS plans, included the following: The discharge of Shingle Creek; this alternative involves the continued discharge of wastewater effluent from the Orange County Sand Lake Road and City of Orlando McLeod Road treatment facilities at their existing discharge locations. Inclusion of this alternative is for the sole purpose of determining the level of EPA grant funding. This is because Orange County and the City of Orlando have agreed to a Florida Department of DER, directive to eliminate the discharges of wastewater effluent to Shingle Creek from their respective facilities. To determine the level of grant funding, the EPA required, through its advanced treatment, review process that two levels of treatment for nitrogen and phosphorus removal be evaluated; these are as follows:

First, secondary treatment plus nitrogen and phosphorus control to 3 milligrams per liter, total nitrogen and 0.2 milligrams per liter, total phosphorus. Second, secondary treatment plus

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phosphorus control to 0.2 milligrams per liter, total phosphorus.

Second: This alternative, called the Groundwater Conservation Program, involves the injection of highly treated wastewater effluent into the upper zone of the Floridian Aquifer. Reclaimed wastewater would be pumped from the treatment plants to injection areas and then distributed to injection wells.

Third: This alternative is the citrus irrigation alternative. This involves the slow rate irrigation of about 10,000 acres of existing citrus groves in western Orange County and eastern Lake County. The wastewater treatment level required for this alternative involves secondary treatment followed by filtration and high level disinfection. Under this alternative, land would not be acquired nor irrigation systems funded for citrus irrigation. Instead, renovated wastewater would be provided under pressure to the property lines of the groves. The grove owners would be responsible for the construction operation and maintenance of their individual irrigation and distribution systems. Renovated wastewater from the treatment facilities would be pumped to a

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distribution center located near the center of the area of the proposed irrigation target area.

A reserve storage reservoir, located south of the distribution center and east of Lake Ingram, would also be needed due to short-term minimum and peak irrigation and freeze protection requirements and scheduling. Required storage volume would range from about 900 to 2400 acre-feet. The reservoir would, therefore, require from 170 to 420 acres at a depth of about 5.5 feet. Average annual citrus irrigation rates were estimated to range from 26 to 72 inches, depending on local conditions.

Next alternative, Rapid Infiltration Basins; this method of effluent disposal involves application of treated effluent to infiltration basins located in the well-drained sandy soils of western Orange County. The infiltration basins would be constructed as long, narrow channels following the existing topography of the proposed sites. Effluent would be applied to flood the basins for a period of one to two weeks. The basins would then be allowed to dry for about the same period, or longer, before beginning the next wetting/drying cycle.

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Effluent percolating through the basins would enter the water table and move downward and/or laterally away from the site. Secondary treatment followed by infiltration and high level disinfection was determined to be the required treatment level for this disposal method. This treatment level has been found to be an effective method of inactivating viruses and bacteria in wastewater effluents.

Deep well disposal was also looked at. This alternative involves the injection of treated effluent into a highly transmissive rock zone containing waters saturated with sale. Potential injection zones must be separated from wastewater aquifers by confining layers which would prevent or significantly retard upward movement of the injected effluent. Potential injection areas were identified in extreme eastern portions of Orange County and Osceola County and in Brevard County.

A combined citrus irrigation/rapid infiltration alternative: This alternative involves the use of a combination of the citrus irrigation and rapid infiltration alternatives. The distribution center and citrus target areas proposed under the citrus irrigation alternatives are also proposed under this alternative. Wells would be used for

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satisfying peak citrus irrigation and freeze protection demand, eliminating the requirement for the storage reservois.

Rapid infiltration sites are identical to those proposed for the rapid infiltration alternative. However, fewer sites would be required under this approach. These sites would be used to dispose of the renovated wastewater, not directed to the citrus irrigation system. The treatment required is secondary treatment followed by filtration and high level chlorination.

On-lot disposal was looked at. This alternative involves the use of the combined citrus irrigation rapid infiltration alternative was used with on-lot systems, septic tanks, servicing about 2.3 million gallons a day, of the projected year 2000 wastewater flow. Total flow to the citrus irrigation, rapid infiltration system, would be reduced to approximately 41 million gallons per day. Septic tanks would be used in projected low density residential development areas within the urban service area, having suitable soils.

As required under the regulations, no action alternative, no Federal action, were also looked at, and involves the use of septic tanks and locally funded subregional treatment facilities to treat the projected wastewater flow in excess of the existing design capacities of the Sand Lake Road and McLeod Road treatment facilities. That is 15 and 13 million gallons per day, respectively. Approximately 2.3 million gallons per day of the projected flow would be handled by septic tanks. Two subregional treatment facilities would be constructed to treat the remaining year 2000 flow of 13 million gallons per day.

Treated wastewater effluent from the McLeod Road, Sand Lake Road and Orangewood subregional plants would be pumped to the citrus irrigation, rapid infiltration facilities proposed in the combined alternative. The effluent from the northwest subregional facility would be disposed of by rapid infiltration at sites in the vicinity of the plant. Secondary treatment followed by filtration and high level disinfection is the treatment required at each facility.

The no action alternative would involve no action on the part of the 201 participants. The existing facilities would remain at their present capacities and allow continued discharge of effluent to Shingle Creek. This would result in the

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continued eutrophication and degradation of Lake Toho. New development within the existing service area would be allowed to connect to the sewer system until the plant capacities were reached.

Any additional development would provide their own wastewater treatment and disposal facilities. These would include septic tank systems and package wastewater treatment facilities. This alternative is not acceptable to either the State or Federal regulatory agencies or the 201 participants.

The alternatives described above were evaluated in terms of cost, operability, implementability and environmental impact. The evaluation of the alternatives with respect to these categories is summarized in page 1 in your handouts.

As can be seen from page 1 in your handout, the difference between the highest alternative present worth cost, being the groundwater conservation program, is more than twice the lowest alternative present worth cost, being the rapid infiltration basins. Three alternative present worth costs are within 10 percent of the lowest present worth cost, and can be considered to be essentially equivalent based on the level of precision of the cost estimates.

Four alternatives, therefore, could have been selected for implementation based on the cost analysis. These are, rapid infiltration; citrus irrigation, rapid infiltration; on-lot systems, and no Federal action. The latter three alternatives incorporate the combined citrus irrigation, rapid infiltration disposal method.

Operability: Review of the operability summary in Table 1 leads to the conclusion that the least flexibility would be afforded by the rapid infiltration basins alternative. Also, the no Federal action alternative would increase the scale and complexity of the operation and maintenance effort required to treat and dispose of the projected wastewater flow. This is because two additional subregional facilities and additional disposal area would be required.

Implementability: With the exception of the no Federal action alternative, all of the four least cost alternatives would be equally implementable. The no Federal action alternative would result in significantly increased user charges or development costs or both. Public acceptance of significantly increased user charges would be very doubtful; modification or enhancement of project

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design criteria would be anticipated to be necessary with respect to potential aesthetic and property value impacts of the proposed rapid infiltration basins on adjacent areas.

Other obstacles to implementation would not be anticipated for these alternatives. The no Federal action alternative would be anticipated to be the only alternative with significant implementation problems due to the public and development interests impacts of increased user charges.

Environmental impacts: Hydrogeologic modeling efforts conducted during the 201 planning effort indicated that the rapid infiltration basin alternative would result in a greater level of impact on lake and groundwater levels than those of the citrus irrigation alternative. This general category of impact is expected for all four least cost alternatives.

Impacts on land uses, associated with increased groundwater and lake levels, would be anticipated to be less severe for the alternative utilizing the combined citrus irrigation/rapid infiltration basin disposal method.

The most significant differences in the least cost alternatives incorporating citrus irrigation/rapid infiltration are associated with the no Federal action alternative. This alternative includes two additional subregional facilties.

The proposed location of the northwest subregional plant is in the Clarcona area of rural service area west Orange County. This plant site is outside the urban service area and could create development pressure in the rural area adjacent to the site and along the interceptor corridor to the plant. The provision of sewer service to development in these areas would conflict with the Orange County grove management plan.

The Orangewood subregional facility would be located at the site of the existing Orangewood lift station south of the Sand Lake Road plant. This is an existing residential area; aesthetic and odor impacts to this area could occur.

Selection of the no Federal action alternative, therefore, could result in potential adverse aesthetic and odor impacts on an existing residential community and potential conflicts with Orange County grove management. In addition, a relatively significant increase in sewer user charges would be anticipated.

Description of the preferred alternative

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based on a systematic evaluation of the above alternatives, the citrus irrigation/rapid infiltration basin alternative was selected as the most cost-effective and environmentally sound alternative. This alternative was selected over the rapid infiltration and on-lot disposal alternatives on the basis of operational flexibility and cost, respectively. The 201 planning area and selected plan are depicted on Map 1 in your handout.

The citrus irrigation/rapid infiltration basin alternative provides for the productive re-use of renovated wastewater on privately owned citrus groves in west Orange County and eastern Lake County. Utilization of this renovated wastewater is planned for both crop growth and freeze protection. Rapid infiltration basins will be used to dispose of the renovated wastewater which is not utilized for citrus irrigation. Peak irrigation and freeze protection demands will be supplemented using a system of about 56 supply wells stratigically located throughout the renovated wastewater distribution system.

Federal funding will be received for expanding and upgrading the Orange County Sand Lake Road and City of Orlando, McLeod Road treatment

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facilities. Subregional systems for developing areas south of the Sand Lake Road facility are planned to be served by developer financed facilities to be owned and operated by Orange County. The flows from within the urban service area portion of the 201 planning area will be transported to the two facilities by a system of existing upgraded and new interceptors.

A common 15½ mile, 54-inch effluent transmission main will be utilized after the junction of two individual transmission mains from the two facilities. Federal funding has been received for the transmission mains and all remaining facilities which relate to effluent disposal.

The terminal point of the transmission main in the distribution center located near the Lake County line in western Orange County. Approximately 20 million gallons of renovated wastewater will be stored at the distribution center and pumped, as needed, to the citrus irrigation and rapid infiltration basin distribution system. The distribution system will supply the renovated wastewater, under pressure, to the grove owners' property line. Construction, operation and maintenance of all required irrigation equipment and distribution

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piping on the grove owners' property will be the responsibility of the individual grove owners.

The rapid infiltration basin areas are depicted on Map 1, in your handout; less than 20 percent of the land area will be used for actual basin construction. Reforestation of the remaining site areas is planned in conjunction with retention of existing productive citrus and vegetated areas. Landscaped buffers are also planned in the immediate area of individual basins for visual screening purposes.

Management and costs of the proposed collection and treatment facilities will be the responsibility of Orange County and the City of Orlando. Capital costs for jointly used facilities will be shared equally by the entities in accordance with an interlocal agreement dated July 28, 1983 between Orange County and the City of Orlando. Operation and maintenance costs of the joint facilities will be allocated to the entities in proportion to their flow contributions. Increases of $8.50 and $4.50 per month in the average single family residential service charges are anticipated to be required for users in the County and City systems, respectively. I think at this point I will turn it over to

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Mike Cliburn, with Mayes, Sudderth and Etheredge, who is going to discuss some more detailed environmental analysis than I have brought to you.

MR. CLIBURN: Thank you, Bob. The evaluation of the environmental impacts of the selected programs of water resources, of water quality, air quality, ecological systems, storage for resources, and population and land use.

At the time this program was selected, concerns were expressed about the potential rapid infiltration basins, relative to the levels and qualities of the groundwater and lakes, adjacent to the sites. Therefore, a major focus of environmental impact evaluation was made in these areas. I would like to summarize our major findings for you tonight.

Groundwater mounding occurs as a result of the build-up of water beneath the acquifer basins; as water percolates down, it reaches the water table. The evaluation was performed to determine the effect of the groundwater mounding in areas that were sensitive, as determined, based on groundwater mounding studies.

On 201 projections, it was determined that a small depressions adjacent to sites 6 and 9 could

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eventually become small enclosed lakes; however, there were only minimal impacts anticipated on citrus groves adjacent to the RIB site.

Groundwater table, can also result in raising lake levels adjacent to the RIB infiltration site; as a result the concerns expressed about this potential impact.

The County Commission adopted a resolution which calls for institution of remedial measures if lake levels come to within 18 inches of the 100 year flood levels of adjacent lakes. Therefore, we have our evaluation focused on the areas within the 100 year flood plan level; this evaluation determined that there were land uses including natural vegetation, citrus groves, residences within the 100 year flood plane. It could potentially be affected by increase and lake levels to the 100 year flood plane level.

Therefore, in order to avoid impact, the County has included lake level monitoring programs, in its ongoing management of the rapid infiltration basin, in order to, as one mitigating measure to avoid such impact. Designed guidelines have been adopted by the County for rapid infiltration basin, to minimize such impact.

PENGAD CO., BAYONNE, N.J. 07002 · FORM 2

And, our findings of that would be that the impact potentially, adverse impact of the increased water table and lake levels could be avoided by the inclusion of these mitigating measures. The following grant has been incorporated into the project by the United States Environmental Protection Agency.

If operation of the rapid infiltration basin system is shown to cause unreasonable adverse impacts, such as property flooding or damage, crop flooding or damage, adverse water quality impacts to area lakes, significant impacts to area lakes, significant impacts to the areas' groundwater quality or adverse impacts from groundwater level rises, the following mitigative measures shall be considered and the most appropriate ones taken by the county or other operators of the grant funded facilities to correct the problem.

A. Reduction in loading to specific basin sites
B. Relocation of specific basin sites
C. Expansion of the acreage of the basin sites
D. Additional basin sites
E. Increase use of irrigation
F. Increase level of treatment prior to infiltration

These measures end appropriate by the

environmental impact statement to minimize potentially significant adverse impacts.

With respect to water quality, the areas of concern were in the groundwater quality beneath adjacent rapid infiltration sites, and the lakes that were adjacent to the sites. As a result the waterfall analysis of effluent from treatment plants, McLeod Road and Sand Lake Road, has been based on the evaluation of the renovation that would occur as the water percolates downward. It was determined the renovated water from the rapid infiltration basins, will meet primary drinking water standards, with the possible exception of nitrates.

The total nitrogen of concentration taken of renovated wastewater anticipated 12 to 15 milligrams per liter.

Concentration of the groundwater in the vicinity of the rapid infiltration would be expected to be 10 milligrams per liter or less, due to the dilution to adjacent groundwater and recharge of the rainfall. In order to assess potential impacts of the rapid infiltration, based on waterfall, surveys were performed in June and August, 1983, in Lake Ingram, Hancock, Hartley, Black and Spear.

As a result of the data that was obtained

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from the survey, it was determined that the lakes are receiving a substantial quantity of nutrients, primarily nitrogen and phosphorus, and that the land locked lakes exhibited more stress than those which received inflow and outflow.

In four of the five lakes that were sampled, it was indicated that phosphorus is the nutrient that is limiting the growth of algae. The fifth lake, Black Lake, is possibly limited by the light penetration, due to the dark stained water.

The implications of this are that the rapid infiltration basins, may affect potentially groundwater, lake water quality; is the result of movement of nitrogen and phosphorus from rapid infiltration basins to the lakes.

However, although the nitrogen concentrations are expected to increase in the groundwater quality to the lakes, this is not expected to be a problem, because the lake appears to be phosphorus limited; the phosphorus concentrations in the groundwater reading of the lakes is not expected to increase.

Rapid infiltration is not expected to increase; as a result of removals that will occur in the soil. So, in conclusion, we believe this project

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has been designed and can be opted to avoid significant environmental impact. In fact, we believe that the project can result in environmental benefits, which occur from reusing the treated wastewater that would outweigh the potential environmental impacts.

MR. COOPER: Thank you, Mike. Pursuant to the guidelines of the President's Council on environmental quality and the rules and regulations of the Environmental Protection Agency with regard to preparation of EIS's; this public hearing is being held to receive comments on the draft EIS. This draft is being discussed in a public forum to encourage public participation in the Federal decision-making process, and to develop public understanding of Federally-funded projects.

In this regard, the draft EIS was made available to the public on December 7, 1984, and is listed in the Federal Register on December 28, 1984. The Comment period will extend until February 14, 1985. Any comments received during this evening and during the comment period following will be part of the official record of this project.

With that in mind we will now begin the public comment portion of the program. I would like

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to remind any of you who wish to speak to fill out one of the cards on the back table if you have not already done so. Members of the hearing panel may ask questions of the person presenting oral statements when it is felt necessary to clarify the nature and substance of the comment being made; however, I would ask that the audience not ask questions of people not making comments, nor should questions be asked of the hearing panel.

The reason for this is not to foreclose discussion, but to move ahead with the purpose of the hearing, which is to receive comments. All statements made here tonight will be responded to in the final environmental impact statement. Before you make your statement, please identify yourself by name, and if appropriate, the group organization which you represent

Please make your comments at the microphone here or loud enough for everyone to hear, to ensure that your remarks are audible to the audience and the Court Reporter, as well as recorded on our tape.

Now, we had no one indicate before the meeting they wished to make a statement. Is there anyone here now that wishes to speak this evening?

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MR. MACKEY: I am Bob Mackey, I am a citrus grower, at least I was until the freeze. Have you all evaluated the effect this freeze is going to have on this projected program, as far as putting water into the groves is concerned?

And, my second question is, have you addressed the question of Temix; most of these people that are going to do this in the groves, at least the ones I know of, use Temix quite widely, and with 52 inches of water a year, by nature, in normal times, plus what you will add to it, will it have any effect on the groundwater? You know what I am talking about.

MR. COOPER: Regarding your first question, it is too early to tell for sure what the impact with the trees is, for the fruit. Our indications are so far that it will not have any significant adverse impact on our program, since many of the growers have indicated to the City already they are going to replant.

There will be continual meetings between the Government's responsibility, and the growers; we will have to work on it as we go. As of now, we don't think there will be serious, adversed impact of the project. Do you feel like saying anything else on this?

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MR. CLIBURN: Regarding your question about Temix; the irrigation is to be conducted. It is going to be replacing the irrigation the growers are doing now, with the drawing the water out of the ground. So, overall, there wouldn't be a net increase in the amount of the waters that is being used for irrigation; it is just coming from a different source, and would not say it was creating a difference in that impact.

MR. MACKEY: I think the water has no Temix; Temix comes from the application.

MR. CLIBURN: There would be no Temix in the irrigation water from this program either; so, the Temix that is there, the effects would be the same, whether you use the irrigation system the growers were previously using, or wastewater; there would be no difference.

MR. COOPER: Any other comments from the floor?

DR. SZABO: My name is Doctor Emery Szabo. I am the vice president of the Avalon Homeowners Association; and I represent most of our members. We have always been opposed to this plan; we are still opposed to it, and we will remain opposed to it.

We wish that Orlando and Orange County

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would keep their sewage and the odors in Orlando, and their areas where they develop sewage, and they would keep this and irrigate their own backyards and follow their own environment; and follow their own homes. We don't want it, so please put it back there.

Let them use it in their own places; keep your odors right where they belong. You state that the sewage water that you are going to use for irrigation, irrigating citrus will be no more than the citrus grove owners use now. It will be much more, because they are committed to use 26 to 50 inches per year, and that is certainly, there is no grove owners at the present that uses that much water for pumping.

You are going to have an environmental impact on the lakes. What about our wells; what are you going to do about our wells? You are going to put your sewage in our well water, our drinking water; we don't want it. You have already put EDB in there, now you are going to put in your filth. If you want to drink it with all the drinking water quality, then damn it drink it. We don't want it to drink.

Temporarily this is enough; I will speak a little more later.

MR. DELNEKY: My name is Gabe Delneky, I

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am chief engineer of public utilities. During the last two years, since the initiation of this project, we had this same thing from Doctor Szabo, and we even provided, satisfied every requirement which came from the Homeowners Association. He still was opposing the project.

We had an agreement; I feel that through the resolutions the Orange County Commissioners issued to the resolution and through the personnel contacts and Seminole meetings of that Association. The owners are satisfied with the requirements, and I would like to ask Doctor Szabo to read the documents of the EIS documents, and the documents will answer all of your questions regarding the water pollutions and any other concern you just mentioned.

MR. COOPER: Is there anyone else that would like to make a statement?

MRS. SZABO: I am Nancy Szabo; we occupy the same home. Everyone said nothing would happen to our well water; we have EDB in ours. That is number one.

There are a lot of people here suffering the same thing; what is this going to do to our water, and our property values are nil right now. Would you like to buy our home?

MR. COOPER: Let me speak.

MRS. SZABO: It is a million things; you say; state of the art; I am scared to death when you all say, state of the art. The Iron Bridge has never worked; that was a state of the art; so this is our fear, at least it is mine.

I will speak for myself right now; it is my fear, and I know that there are homes out there that nobody wants to buy; we can't drink our water. I don't know if we should be bathing in it; this was before you all started the dumping of Orange County's mess on us, or, excuse me, Orlando.

As far as satisfying me, you will have to go a long way to satisfy me; I am just speaking for myself.

MR. DELNEKY: If EDB is on your property it is already there; this project will not bring any additional EDB to your property.

MRS. SZABO: In all that water, you all just talked about mounding, and the lakes coming up.

MR. DELNEKY: Please read the documents; we assured the water quality for you. The water quality is detailed, based on your regressed, we will provide a highly treated wastewater which goes out to the basins and the citrus irrigation; if you read

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the documents, you will find that your questions are already answered.

MS. WHEELER: I am Nancy Wheeler. We have a lot of questions answered, and the water will be good; however, we do oppose it. The idea of it just being sent out our way to get rid of it.

MR. COOPER: Any other comments?

DR. SZABO: I am Doctor Szabo, vice president of Avalon Property Homeowners Association; almost every member of our Association is opposed to this project. Are you opposed?

A VOICE: Yes.

DR. SZABO: Are you opposed?

A VOICE: Yes.

DR. SZABO: Are you opposed?

A VOICE: Yes.

DR. SZABO: Any other member?

VOICES: Definitely opposed.

MR. COOPER: You see --

DR. SZABO: One minute, I am speaking; you gave the impression we were accepting it. We do not accept it, we don't want it, we want you to drink it. It is a drinking water problem; drink it, and you put it on your own land and your own home.

We don't want it; we never have wanted it.

We may have, we have listened to all these statements, but we still don't want it. We have had all your arguments, all your testing and all these results; we still don't want your wastewater, your sewage.

MR. COOPER: Any other comments?

MS. LEWIS: I am Sherry Lewis; I live in Avalon. I want to know if it is going to do any good to oppose it anyway? We can holler the rest of our lives and still get it; that is what I want to know.

MR. COOPER: This hearing, as many of you know, is not the only chance. There has been public involvement and this process has been going on for six years, and there has been extensive involvement of that through various committees, from meetings with the County Commission and City Council. The resolutions between grove owners and the City Council between property owners associations, city and county, and between people working on the project and people out here.

The fact that, you know, one person or a group opposes it, doesn't mean that it won't be built, obviously.

MR. GANICH: I am Al Ganich. You said six years ago; I could have sold my place then. Today, forget it. I am the mad Russion.

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MR. COOPER: Briefly, go back into the history of the project.

MR. GANICH: What happened six years ago; you said this happened six years ago?

MR. COOPER: We started the planning process six years ago, approximately.

MR. GANICH: We weren't notified.

MR. COOPER: Well, we had notices in the paper; we sent out a couple hundred notices to groups we were able to identify.

MR. GANICH: Who?

MR. COOPER: We had public meetings about two years ago.

DR. SZABO: We were not notified; definitely not.

MRS. SZABO: The grove owners called me.

MR. COOPER: Please do not talk unless you are called on. Excuse me, let me finish: We had about two years ago,in the county and the city and all the consultants seriously got down to a group of alternatives that were seriously being evaluated between, more detailed communication of various groups affected, started at that time. It has been going on since that time.

MRS. SZABO: I am Nancy Szabo; we were

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informed about in '83, and it happened to be a grove owner that called me on the phone and told me. Up to that, we knew nothing; absolutely nothing. And, I got on the phone, and I lived on the phone along with a lot of other people, a lot of women in the community; and we got something going.

That is when we found out. Now, another question I have, since most of the groves are gone, and you are going to probably have to switch to infiltration basins where will you take more land to fill that need? That is what I would like to know, how many more homes are going to be lost?

MR. COOPER: As I said before, as of this time we don't expect to have anymore infiltration basins in the plans.

DR. SZABO: I am Emery Szabo: All of our meetings have only made this plan less odious that it was before. We have always been opposed to it; it is not quite as bad as it was originally when you had the rapid infiltration basins going right over our homes and property. We still have the original drafts; it has been modified some, not quite as bad as putting the RIB right over our home, but it is still not desirable.

MR. COOPER: Any other comments?

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MR. CAMPBELL: I am Dean Campbell, St. Johns Water Management District. It has here on your environmental impact study, deep irrigation, freeze protection demands will be supplemented by using a system of about 56 wells strategically located throughout the wastewater distribution center.

I am assuming these irrigations currently have supply wells for supplying the irrigations to the groves currently. Is there a plan for what will happen to these existing supply wells?

MR. DELNEKY: These wells are new defined wells to provide the peak and environment for peak protection; and we designed about 56 communication irrigation valves on the groves, and we also provided ground water wells to the rapid infiltration. These are two groups of wells, one for ground water, and the other group of wells for groves, for freeze protection.

MR. CAMPBELL: What I was interested in was not the wells you are planning to put in, but the wells, I assume will be abandoned, because they are no longer necessary; those are wells that will be abandoned, and no longer available for irrigation: Is that correct?

MR. DELNEKY: I can't answer that.

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MR. RICE: My name is Keith Rice, City of Orlando. Obviously the existing wells that the growers had, they are not going to use them, because they don't want the energy costs of pumping 300 feet below the ground. So, they probably will abandon those wells. I think we can be assured of that.

DR. SZABO: I am Emery Szabo. We were wondering if you would test our wells for us, and test them monthly after you start putting the sewage out there, to see the changes in our water quality, in our wells.

MR. DELNEKY: We are not putting sewage out there; we are putting wells for that wastewater out there, and it is strange that the vice president of the same association has different views that the president.

MR. COOPER: Gabe, could you repeat the substance of what you said?

MR. DELNEKY: I would like to repeat, that we are not sending out wastewater to this area; we are sending out highly treated wastewater, highly treated used water in that area. The second one, I find it strange that the vice president of the same association has different views than the president of the same association. As I mentioned it, we had

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agreed with the Avalon Homes' Association president.

DR. SZABO: To answer Gabe's statement, the vice president and president still are opposed to it. We have accepted it, but we still oppose. There is a difference between wanting something and opposing it, not wanting it.

MR. DELNEKY: Accept it.

DR. SZABO: Next, it is still sewage water, you may have treated it, but it is still your sewage. Please keep it home; you know they are there. I don't know if I answered all your statements or not.

But, all the members of the Avalon Owners, property owners association object to you, and just about all of the other residents of this area.

MR. COOPER: If there are no further comments --

REV. POOR: I am Reverend Poor; I would like to comment on Doctor Szabo's question about testing wells. In all fairness to the project there will be others that can attest to this, there will be a program to monitor surface water and ground water quality on a regular basis.

Ground water samples have already been taken and are continuing to be taken; this is discussed in tenth document, it is discussed in DIS, and I

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don't know whether particular individual wells will be sampled or not; that probably can be discussed later.

DR. SZABO: We are aware of your testing programs; we are aware of it, but we are still worried about our own individual wells, and the effect on our water quality after the program is started.

Checking at the ground water, at the riverside is one thing to check it at the individual's home wells to see if the water is still pure enough to drink is another thing.

MR. COOPER: I would like to thank all of you for attending tonight. I would like to remind you that the public hearing record will remain open until February 14; any of you who have written comments and signed them to myself at EPA in Atlanta; any comments received by February 14 will be considered part of the record, and will be answered and filed in the final EIS.

I would like to thank each of you for your participation here tonight, the comments you have made this evening, and all written comments which we received during the comment period, will be carefully considered and responded to in the final EIS.

That final EIS will consist of the Agency's final decision; a summary of the Draft EIS, any other

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pertinent additional information or evaluations developed since the publication of the Draft, revisions to the Draft, comments received and EPA's responses to those comments as well as the transcript of this hearing.

Those of you who have commented tonight or submitted comments will receive a copy of the final EIS.

Again, thank you for your attendance and participations. I will adjourn this meeting.

(Thereupon the meeting was adjourned at 8:45 o'clock P. M.).

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CERTIFICATE OF REPORTER

STATE OF FLORIDA:
SS
COUNTY OF ORANGE:

I, Dahlia R. Raines, being a Notary Public in and for the State of Florida at Large, do hereby certify that I have reported the foregoing proceedings in the matter of Florida Wastewater Management Draft EIS, January 31, 1985, beginning at 7:30 o'clock P.M., at the West Orange High School Auditorium, 1625 South Beulah Road, Winter Garden, Florida.

Further, I certify that the foregoing pages numbered from 1 to and including 39, constitute a true and correct record of said proceedings.

I FURTHER CERTIFY, that I am not a relative, employee, attorney or counsel of any of the parties, nor relative or employee of such attorney or counsel, nor financially interested in the foregoing action.

WITNESS MY HAND AND OFFICIAL SEAL in the City of Orlando, County of Orange, State of Florida, this 19th day of February, 1985.

Dahlia R. Raines

DAHLIA R.RAINES
COURT REPORTER

Notary Public, State of Florida at Large
My Commission Expires December 1, 1987
Bonded Thru Brown & Brown, Inc.

CHAPTER VI

LIST OF PREPARERS

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LIST OF PREPARERS

PROJECT PERSONNEL

U.S. Environmental Protection Agency	
EIS Project Officer	Robert C. Cooper
Chief, NEPA Compliance Section	Robert B. Howard
Orange County, Florida	
EIS Project Manager	Harold Hill
Mayes, Sudderth & Etheredge, Inc.	
Project Managers	Paul Wagner
	Michael Cliburn
Air Resources	Paula McCullers
	Jim Nissen
Land Resources	Steve Shugart
Water Resources	Robert Fuller
	Steve Shugart
	Steve McCullers
	Robert Rutter
	Paul Wagner
	Karen Wieland
Population/Land Use	Ronald Manley
	Robert Rutter
Transportation/Energy Use	Jim Nissen
Water Resources Management	Robert Rutter
Community Services and Facilities/Taxes and Budgets	Ronald Manley
	Michael Cliburn
Science Applications International Corp.	
Ecological Resources	Richard Ambrose, Ph.D.
	Raymond McCord, Ph.D.
	Tricia Gregory
	Marialice Ferguson
Archaeological Consultants, Inc.	
Archaelogical/Historical Resources	Marion Almy
	Joan Demming
Bionomics, Inc.	
Water Quality Sampling/Analysis	Richard Alt

APPENDIX A

OPERATING PRACTICE RESTRICTIONS

Operating Practice Restrictions*

The intent of this exhibit is to identify and define practices for use of reclaimed irrigation water which protect human health and the environment. Other practices will be established after consultation with the Growers Executive Committee.

1. Appropriate warning signs shall be posted around the sites utilizing reclaimed water by the Owner to designate the nature of the water and its non-potability.

2. The Owner will also take all reasonable precautions, including signs and labeling, to clearly identify reclaimed water systems to prevent inadvertent human consumption.

3. No cross-connections shall be made between the reclaimed water system and other water systems.

4. A distance of 500 feet should be maintained between the periphery of the reclaimed water irrigation system application site and any existing or approved (but not yet constructed) shallow drinking water wells.

5. A distance of 1000 feet shall be maintained between drinking water wells and holding ponds which are incorporated into the irrigation system as an alternate application site.

6. The use of reclaimed water shall be consistent with applicable state and federal regulations.

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* Source: Exhibit C of the standard "Agreement for the Delivery and Use of Reclaimed Irrigation Water".